# Soil Survey of Bruce County

REPORT NO. 16 OF THE ONTARIO SOIL SURVEY

Ontario
Ministry of Agriculture and Food
David Ramsay, Minister

Agriculture Canada
Research Branch
Direction générale de la recherche

# Soil Survey of Bruce County

by

D. W. HOFFMAN

Experimental Farms Service

and

N. R. RICHARDS

Ontario Agricultural College

GUELPH, ONTARIO

January 1954

Reprinted February 1990

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90-05756/2

**For other Counties and**
**Districts Survey Information,**
**Contact the**
**Consumer Information Centre,**
**Ontario Ministry of Agriculture and Food,**
**Main Floor,**
**801 Bay St.,**
**Toronto, Ontario**
**M7A 2B2**

## ACKNOWLEDGMENTS

The Canada Department of Mines and Technical Surveys, and Mapping Branch supplied the base maps. The final copy of the Soil Map for lithographing was prepared by the Cartographic Section of the Division of Field Husbandry, Soils and Agricultural Engineering, Central Experimental Farm Service, Ottawa.

Helpful suggestions pertaining to classification and correlation, and assistance in critically reviewing the manuscript came from Dr. A. Leahey and Mr. P. C. Stobbe, Canada Department of Agriculture, and others.

# PREFACE

*The survey of Bruce County was completed during the summer of 1949.*

*Other counties and districts surveyed and maps published are as follows:*

| | |
|---|---|
| *Norfolk* | *Map only* |
| *Elgin* | *Map only* |
| *Kent* | *Map only* |
| *Haldimand* | *Map only* |
| *Welland* | *Map only* |
| *Middlesex* | *Map only* |
| *Carleton* | *Map and Report* |
| *Parts of Northwestern Ontario* | *Map and Report* |
| *Durham* | *Map and Report* |
| *Prince Edward* | *Map and Report* |
| *Essex* | *Map and Report* |
| *Grenville* | *Map and Report* |
| *Huron* | *Map and Report* |
| *Dundas* | *Map and Report* |
| *Perth* | *Map and Report* |
| *Grey* | *Map and Report* |
| *Peel* | *Map and Report* |

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*FIG. 1—Outline map of Ontario showing the location of Bruce County and other areas for which Soil Maps have been published.*

# Soil Survey of Bruce County

*by*

D. W. Hoffman *and* N. R. Richards

## INTRODUCTION

The soil survey of Bruce County was conducted during the summers of 1948 and 1949 as a co-operative project of the Canada Experimental Farms Service, Ottawa, and the Soils Department, Ontario Agricultural College, Guelph. The project consists of two parts, the preparation of a Soil Map and the writing of a Soil Report.

The Soil Report presents information obtained by the survey. A brief general description of the area is given and factors such as climate, vegetation, topography, drainage and soil materials, all having an important bearing on the soil and soil forming processes, are discussed. Each soil type is described in considerable detail. The description deals with the physical characteristics of the soil by which it may be recognized and discusses its use, fertility and adaptability to crop production.

The Soil Map indicates the location and extent of the different soils and shows such physical features of the area as roads, railways, rivers, towns, houses, etc. The scale of mapping is one inch to one mile and, therefore, does not permit the delineation of soil areas less than twenty-five acres in size.

The Soil Survey Report and the accompanying Soil Map provide the basic information required for the investigation of soil problems. The information contained in this publication should be useful to all those interested in the soil and should enable them to improve farm practices.

### How to Use the Soil Map and Report

To find what soils are on any farm or other area of land, locate the tract on the soil map, which can be found in the envelope inside the back cover. This is easily done by finding the township in which the area occurs and using the lot and concession numbers to locate its boundaries. The lot numbers are shown in Arabic numerals and the concession numbers are shown in Roman numerals.

Each kind of soil can be identified by a symbol on the map. For example, all areas marked with the symbol Pc contain the same kind of soil — Perth clay loam. The name of the soil can be found on the legend printed on the map. Colour is also used to help identify each soil series shown on the map and the colour shown for a soil on the map also appears on the legend.

Although some general information concerning each soil series can be obtained from the legend on the map, much more detailed information appears in the soil report. When the reader has identified the soils occurring on the land in which he is interested he can turn to Part III of the report where the soil is fully described. In addition to a description of each soil, drainage, topography, susceptibility to erosion, crops, and fertility needs are discussed.

Information pertaining to land use, soil management and productivity should then be obtained from Part IV.

Newcomers to the area can use Part I of the report to discover the location of markets and the distribution of roads and railways. Information on principal farm products and types and sizes of farms can be found in PART IV of the report.

Those interested in how the soils of the County were formed and their relationship to the Great Soil Groups of the world should read the section on Factors Affecting the Formation of Bruce County Soils. Chemical and physical analyses are presented in Part V for those interested in the composition of soils of the County.

# PART I

## GENERAL DESCRIPTION OF THE AREA

### Location and Area

Bruce County is located in Southwestern Ontario and is bordered on the south by Huron County, on the east by Grey County and Georgian Bay, and on the north and west by Lake Huron.

According to the 1951 Census of the Dominion of Canada the total land area is 1,056,000 acres or 1,650 square miles. Of this, 793,741 acres or 75.2% is occupied farm land.

### County Seat and Principal Towns

Walkerton, with a population of 2,679 persons (1941 Census) is the county seat and is situated in the middle of one of the best agricultural districts in Bruce County. From the earliest days of settlement the town has been an important marketing centre, for located here are firms such as creameries, grist mills and other businesses which provide a market for the farmer's goods.

Kincardine, Port Elgin, and Southampton are situated on the Lake Huron shore and provide excellent docking facilities for the many pleasure craft that abound in those waters during the summer season. Each of the towns has furniture factories which manufacture products that are well known throughout Canada. The presence of creameries, grist mills, dairies, etc., in these towns makes them ideal centres for the marketing of farm produce.

Wiarton (1,749) is best known as the gateway to the Bruce Peninsula which is famed as a summer playground. The town itself is situated on Colpoy Bay and has a fine natural harbour which is used chiefly by a fishing fleet and various pleasure boats.

Villages such as Teeswater, Lucknow, Tara, Ripley, Paisley, Mildmay, Tiverton and Lion's Head are scattered throughout the County, providing markets for farm produce.

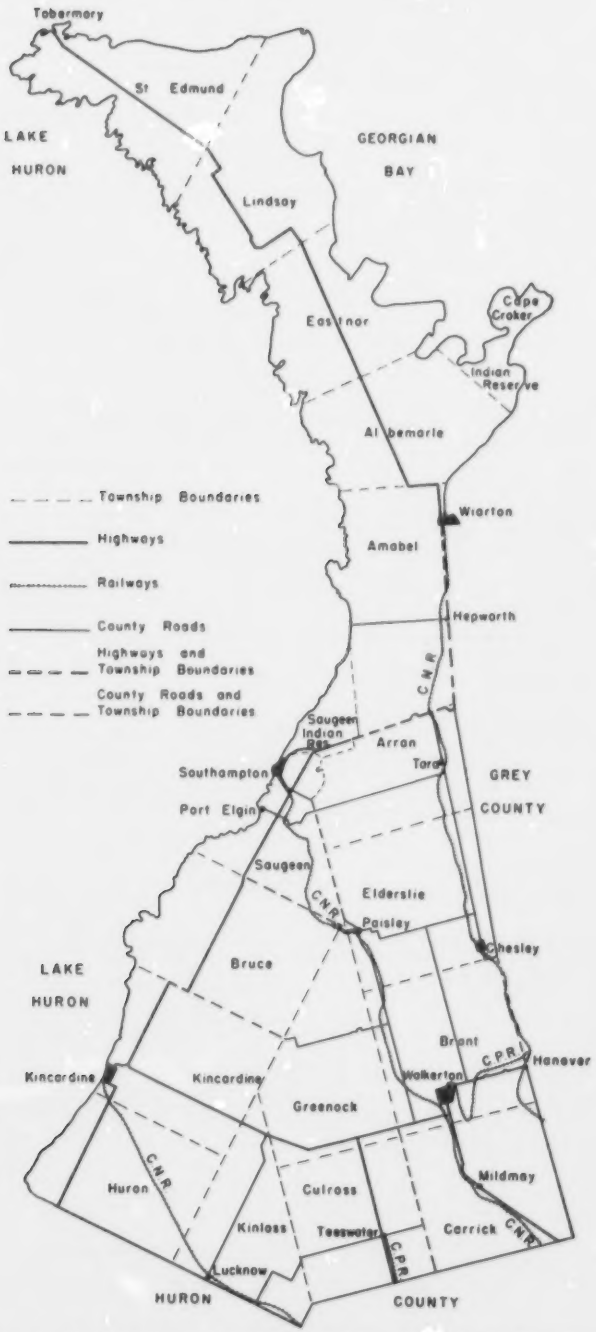



***FIG. 2—Outline map showing townships and principal centres.***

## Population and Racial Origin

The total population of Bruce County, as recorded by the 1941 Census, is 41,680 persons, 20,146 of these being on farms. The population of the urban areas totals 16,623 leaving 4,911 persons as the rural non-farm population. The trend in population is shown in Figure 3. It is apparent that, since 1881, there has been a steady decrease in population. Evidently the shift in population has been away from the County altogether, since neither the rural nor urban areas show a marked increase in population during the period of 1881 to 1941.

Although the population is dominantly of British origin, many came originally from other countries. Table 1 presents figures from the 1941 Census indicating the origin of the population.

**TABLE 1**

**POPULATION ACCORDING TO PRINCIPAL ORIGIN**

| | | |
|---|---|---|
| Total Population | 41,680 | 100% |
| Scottish | 10,707 | 25.7 |
| Irish | 10,266 | 24.6 |
| English | 9,325 | 22.4 |
| German | 8,725 | 19.9 |
| Indian | 817 | 2.0 |
| French | 764 | 1.8 |
| All Others | 1,076 | 2.6 |

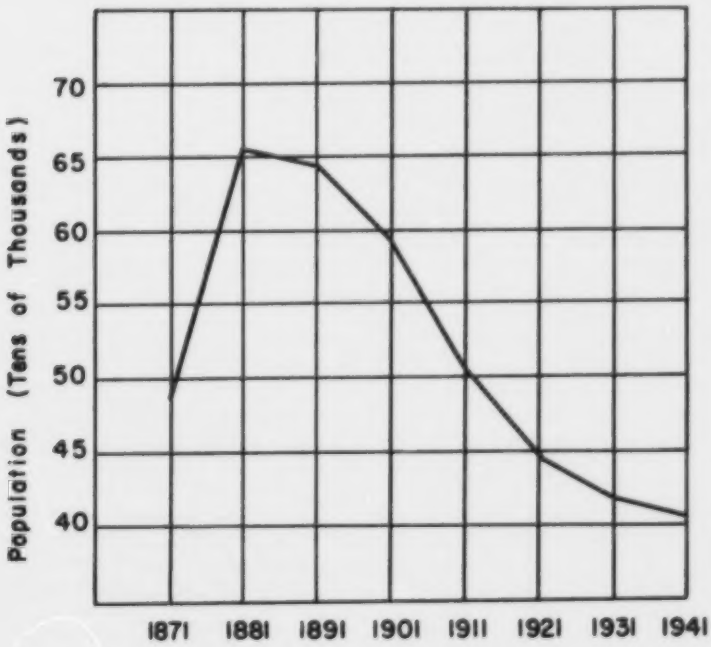



*FIG. 3—Trends in population for Bruce County. (1871 - 1941)*

**Transportation and Markets**

Transportation in Bruce County, for many of its early years, depended upon the waterways. However, in 1848 the government opened up a colonization road running from Simcoe County to the mouth of the Penetangore River. This was the first road in Bruce County.

Since that time many improved roads have been built and the County is now served by a good system of highways. Highway No. 21 follows the Lake Huron shore and connects Owen Sound and Kincardine. Highway No. 6 serves the Bruce Peninsula and has created a good summer playground. This highway also connects Wiarton with Owen Sound, Guelph and Hamilton. Kincardine and Walkerton are joined by Highway No. 9. In addition to these main highways there is a good system of County highways and township roads.

The first locomotive steamed into Walkerton on November 30, 1871. On December 7, 1872 the railway was completed to Southampton. Since that time the railway facilities have been greatly increased. The Canadian National Railway serves the larger part of the County with lines running from Lucknow to Kincardine, Clifford to Walkerton to Southampton, and Hanover to Chesley to Wiarton. These lines meet at Palmerston. The Canadian Pacific Railway has two short lines in the County, one going from Wingham to Teeswater and the other going from Hanover to Walkerton.

The railway systems afford connections to all the major centres and present a means of transportation of farm produce to distant markets.

# PART II

# FACTORS AFFECTING THE FORMATION OF BRUCE COUNTY SOILS

Soils are natural bodies found at the surface of the earth in which plants grow, and are the products of the environmental conditions under which they have developed. Soil development processes are dependent upon a number of factors which include climate, vegetation, soil materials, relief, and age.

## Soil Materials

Soils develop from the materials found at the surface of the earth and their characteristics are influenced to a large extent by the nature of these materials. Disintegrated rock particles constitute the soil skeleton. The chemical and physical composition of the mineral parent material influence profile development, and the movement of soil water within the profile affects the amount of leaching to which the soil is subjected.

As shown in Figure 4, limestone formations occur in the County in long relatively narrow belts trending nearly north and south. On the Bruce peninsula rock outcrops are a frequent occurrence, but in other parts of the County they are rather infrequent owing to the depth of the unconsolidated cover of drift. The uppermost bedrock in the area southwest of Walkerton is fine grained limestone, magnesium limestone and dolomite ranging in colour from grey to brown and belonging to the Norfolk formation. The brownish rock commonly has dark brown to black bituminous streaks parallel to the bedding planes and the grey or thicker bedded strata may have thin shaly partings along some of the bedding planes. Next to this formation is a narrow band of the Bertie-Akron formation running through Walkerton to Southampton which consists of brown to grey finely crystalline to dense dolomite and dolomitic limestone. The Salina formation occurs next to the Bertie-Akron series underlying the soil in Saugeen, Arran and Elderslie Townships. This formation exhibits alternate grey and brown zones. The brown consists of fine-grained to dense dolomite and the grey varies from argillaceous dolomite to dolomitic shale. The Guelph and Lockport formations occupy most of the Bruce Peninsula, the Guelph formation being situated in the westerly part of the Peninsula. These formations consist of fine-grained, crystalline, and granular dolomite which is buff or brownish grey in the upper part becoming grey to almost white at the base. A narrow streak of the Medina formation occurs along the easterly side of the Bruce Peninsula. Although this formation is made up of three members, the Manitoulin member is the principal member found on the Peninsula. The rock is grey to blue-grey, medium to fine-grained, thinly bedded, compact and semi-crystalline. The weathered surface is usually stained and rough, due apparently to the rock being composed of layers of unequal hardness. The Queenston formation occurs on Cape Croker and is typically a brick-red, argillaceous and sandy shale with many green bands and mottlings.

Analyses of the Bruce County bedrock formations are presented in Table 2.

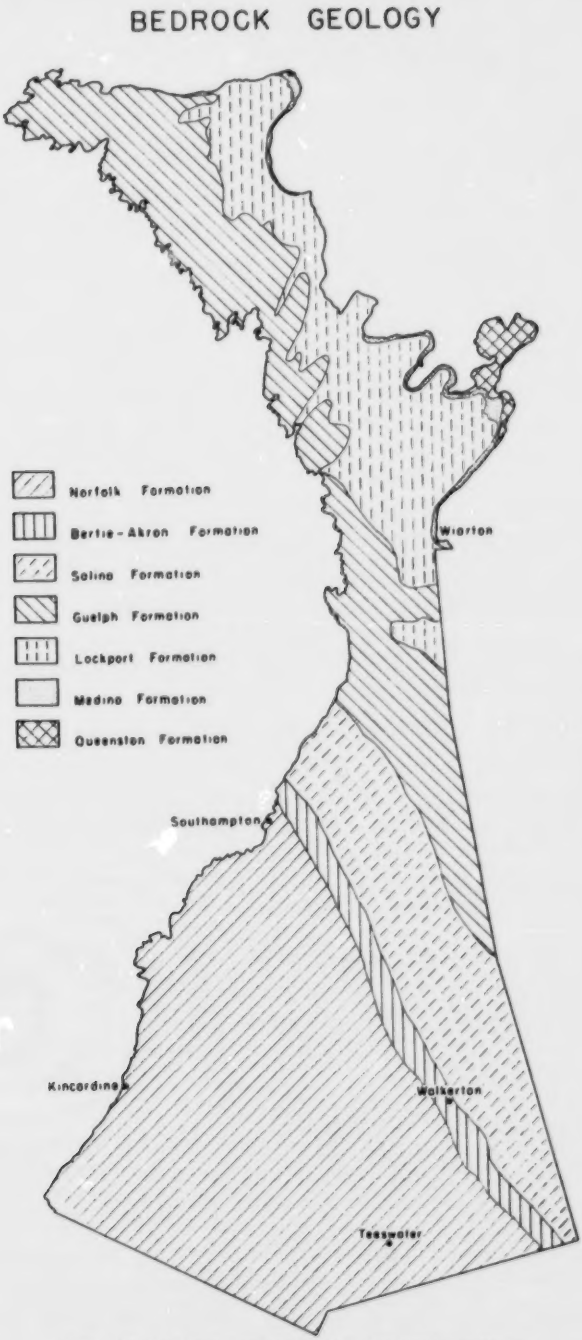



*FIG. 4—Outline map showing bedrock geology.*

## TABLE 2

### ANALYSES OF BEDROCK FORMATIONS

| Formation | 1. Queenston | 2. Medina | 3. Lockport | Guelph | 4. Salina | 5. Bertie-Akron | 6. Norfolk |
|---|---|---|---|---|---|---|---|
| Silica Oxide ($SiO_2$) | 53.20 | 7.80 | 0.82 | 0.36 | 12.34 | 0.44 | 0.26 |
| Ferric Oxide ($Fe_2O_3$) | 6.91 | 1.17 | 0.26 | 0.11 | 0.41 | 0.14 | 0.21 |
| Alumina Oxide ($Al_2O_3$) | 17.73 | 1.14 | 0.40 | 0.19 | 3.93 | 0.16 | 0.09 |
| Tri-Calcium Phosphate ($Ca_3(PO_4)_2$) | ..... | 0.07 | 0.06 | 0.04 | ..... | Tr | 0.02 |
| Calcium Carbonate ($CaCO_3$) | 10.71 | 50.62 | 55.50 | 55.00 | 43.07 | 55.04 | 56.86 |
| Magnesium Carbonate ($MgCO_3$) | 6.80 | 39.11 | 42.77 | 44.67 | 33.79 | 43.82 | 42.28 |
| Total | 95.35 | 99.91 | 99.81 | 100.37 | 93.54 | 99.60 | 99.72 |

Analyses samples come from:

1. Milton Brick Company, Halton County.
2. Quarry of Law Construction Company, Owen Sound.
3. Quarry of J. S. Cook, Wiarton.
4. Exposure near village of Tobermory.
5. Analysis by Dept. of Mines, Ottawa — J. F. Caley.
6. Quarry of Gypsum Lime and Alabastine Canada Ltd., Teeswater.

* Limestones of Canada, Their Occurrence and Characteristics Part IV Ontario. Canada Dept. of Mines and Resources, Bureau of Mines No. 7 81.

In most of Bruce Peninsula bedrock is covered with unconsolidated materials or drift which was laid down by the last or Wisconsin glaciation.

Small areas of flood land along stream courses, areas resulting from wind and water erosion, and areas of peat and muck are of more recent origin.

These unconsolidated surface deposits form the parent materials of Bruce County soils. The soil materials present in Bruce County are shown in Table 3 and their distribution is shown in Figure 5.

## TABLE 3

### SOIL MATERIALS

1. Coarse open till
2. Loamy limestone till
3. Subaqueous till
4. Lacustrine
5. Glacio-fluvial
6. Outwash
7. Limestone bedrock
8. Organic deposits

### 1. Coarse Open Till

Coarse open till occurs where the melting ice has left deposits of considerable depth which have not been subsequently modified to any appreciable extent by water. There is a lack of sorting shown by the presence of stones ranging in size from grit to boulders interspersed throughout the matrix of sand, silt and clay in varying proportions. The materials are calcareous.

The coarse open till materials occupy a small part of Bruce County and are found in the southeastern section of the County.

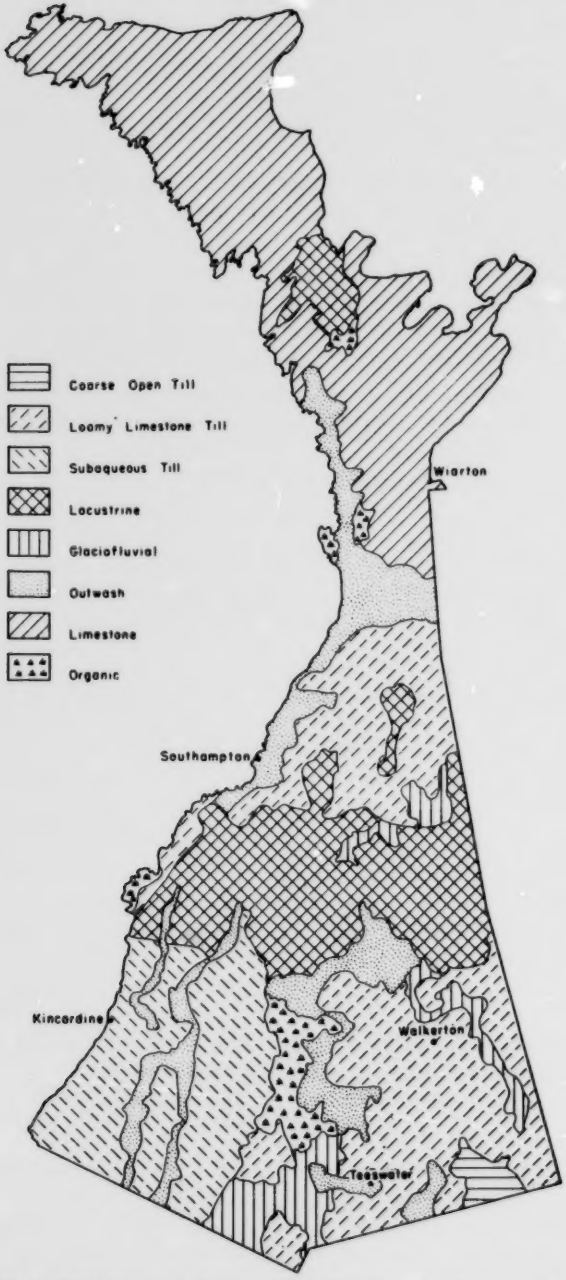



***FIG. 5—Outline map showing distribution of soil materials.***

The soils found on the coarse open till materials are usually very stony and are often coarse to medium textured. The topography of these soils is usually irregular and steeply sloping.

**2. Loamy Limestone Till**

Like the coarse open till materials, the loamy limestone till materials are unsorted deposits where the melting ice left drift not subsequently modified to any great extent by water.

This till occurs mainly in the southwestern part of the County but a large area also occurs in Arran and Amabel townships.

The till is largely composed of materials derived from the underlying limestone bedrock although varying amounts of Precambrian rocks may be present. Limestone or granite boulders and stones are associated with a loamy matrix. The pressure of the ice has compacted these stones and finer materials to such an extent that soil water moves freely but not too rapidly.

The loamy limestone till is drumlinized and the topography varies from smooth moderately to steeply sloping.

In the northern part of the area the till may vary somewhat due to water action. Thin deposits of gravel may occur at the end or top of the drumlins. The till also may vary in compaction and stoniness.

**3. Subaqueous Till**

The subaqueous till materials occupy a large section of the southwestern part of Bruce County. The till is a brown calcareous clay containing a minimum of pebbles and boulders. It is usually only six to ten feet thick and rests on stratified clay of the same colour. The bulk of the clay in the upper till sheet is quite likely reworked material from the beds below. The till is fairly uniform and occurs as ground moraine having smooth very gently rolling to smooth moderately rolling topography.

**4. Lacustrine**

An area of the County running from Chesley to the lakeshore is occupied by lacustrine materials. Such materials were deposited from ponded or very slowly moving water by the settling of the fine silt and clay particles. These sediments are variable in composition showing that they have been derived from different rocks. Siliceous and argillaceous materials had been transported by glacial streams from other localities and had been deposited and mixed with calcareous materials. In this way lacustrine materials of variable composition are formed.

The texture is medium to fine, but fine textured materials are dominant. The plains are stonefree since only fine sediment has been deposited. The topography varies from smooth very gently sloping to smooth moderately sloping.

**5. Glacio-Fluvial**

These are materials that are formed by the action of both ice and water. They are poorly sorted, having an extreme range and frequent and abrupt changes in particle size. As this formation occurs in close association with the till, pockets of till often occur with sand and gravel.

The action of ice and water was such that the deposits were badly deformed. As a result the topography of soils developed on these materials consists of irregular steep slopes.

Glacio-fluvial materials occur most commonly in the western portion of the County.

**6. Outwash**

Outwash materials are scattered throughout the County and are most commonly found in the vicinity of the stream courses.

Outwash is the term used for stratified drift that is stream built. Such material is well sorted and the average grain size diminishes downstream while the degree of roundness rapidly increases. The material is usually sand and gravel deposited in smooth gently sloping outwash plains and terraces.

The depth of the outwash material is quite variable. It may vary in depth from one to twenty feet; in some cases it is underlain by compact till while in other places, particularly in the northern part of the County, it is underlain by bedrock.

**7. Limestone Bedrock**

The limestone bedrock outcrop occurs most commonly on the Bruce Peninsula. In some localities a shallow covering of till, outwash or organic material may occur over the bedrock. In such areas shallow soils may have formed. Therefore, the area delineated as the limestone bedrock varies widely in texture, topography and drainage.

The composition of the limestone also varies since the area is made up of several bedrock formations.

**8. Organic**

The humified remains of trees, herbs and mosses make up organic surface deposits. Organic deposits are common in Bruce County, one of the best examples being the Greenock swamp situated in Greenock Township. The organic deposits occurring in Bruce County are usually well decomposed and are designated as muck. They are underlain by sand, clay or marl. Their reaction is approximately neutral and the topography is level to depressional.

**Relief**

The elevation of the land in Bruce County is indicated by the brown contour lines on the enclosed soil map. The altitude ranges from 600 to 1,025 feet above sea level. The highest part of the County is in the Walkerton district from where the elevation falls toward Lake Huron.

One of the important factors related to soil formation and soil management is the topography or relief of the land. The degree of slope influences drainage, run-off of surface water, and erosion, and in some instances restricts the use of farm machinery. The average slope of the topographic classes and the total area of each slope group are given in Table 4. The major distribution of the topographic classes in Bruce County are shown in Figure 6.

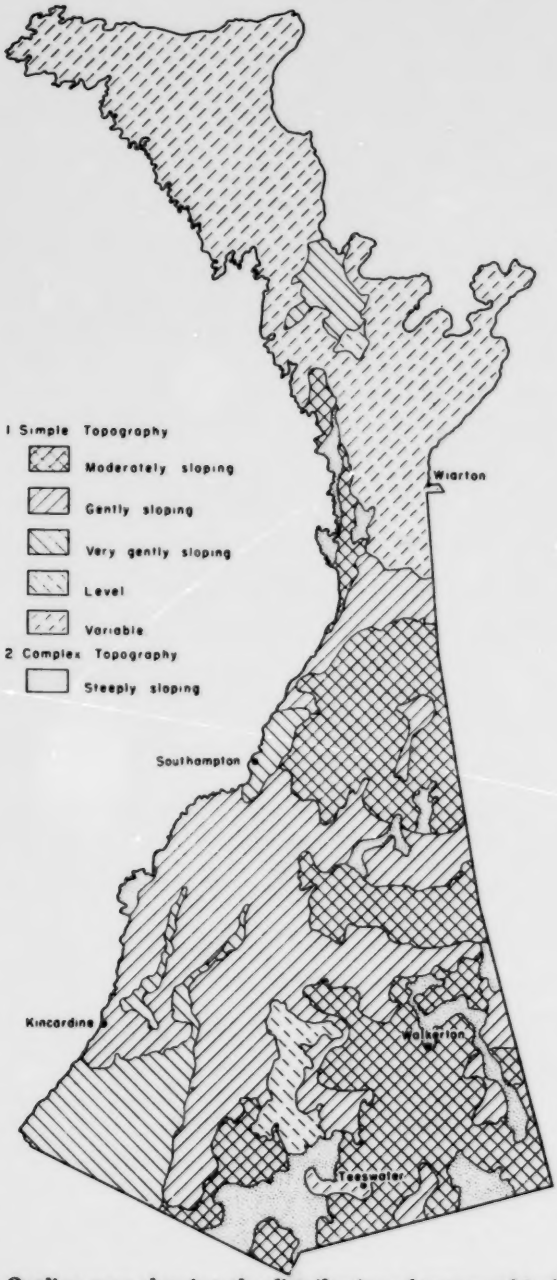



*FIG. 6—Outline map showing the distribution of topographical classes.*

## TABLE 4

### SLOPE GROUPS IN RELATION TO TOPOGRAPHY

| Topographic Term | Per Cent Slope | Per Cent Total Land Area |
|---|---|---|
| *(a) Simple Topography* | | |
| Depressional to Level | 0–0.5 | 6.5 |
| Smooth very gently sloping | 0.5–1.5 | 17.5 |
| Smooth gently sloping | 2.0–5.0 | 21.5 |
| Smooth moderately sloping | 6.0–9.0 | 20.3 |
| Variable | ..... | 26.2 |
| *(b) Complex Topography* | | |
| Irregular steeply sloping | 10.0–15.0 | 8.0 |

A large part of the land west of Teeswater and north of Lucknow consists of irregular steep slopes. The slopes are frequent and comparatively short. Small depressions are characteristic of the relief. The area east of Teeswater and around Walkerton consists largely of smooth moderate slopes. A large area bordering the Lake Huron shores and in the Chesley region consists of smooth gentle to very gentle slopes.

**Drainage**

The County is drained by streams and rivers that empty into Lake Huron. The streams emptying into the Lake along the shore south of Port Elgin are deeply entrenched. The friable till and lacustrine materials are rapidly cut down leaving deep gullies with barren slopes. The main rivers draining the southwestern part of the County are the Pine and Penetangore. The Saugeen and Sauble River systems drain a large part of the central portion of the County. The streams draining the central area are not so deeply entrenched at the lakeshore but the tributaries of these systems have caused severe dissection in some parts of the County and serious soil loss has occurred.

Numerous small lakes and rivers provide drainage for the northern part of the County. The drainage systems for Bruce County are shown in Figure 7.

**Climate**

Climate is an important factor in the formation of soil from rock materials and in determining the crops which can be grown in an area.

The climate of Ontario is usually stated to be a modified humid continental type*. The location of the region with respect to large bodies of water greatly modifies both temperature and moisture relationships.

The meteorological stations located in the County are situated at Lucknow, Walkerton, Southampton, Wiarton, and Tobermory. Since the climate of an area is reflected in the development of the natural vegetation and soils, a comparison of climatological data from the County is made with that of other stations representing other vegetative zones.

Kapuskasing represents the northern coniferous region and Huntsville the transitional zone between hardwoods and conifers.

* The Climate of Southern Ontario — Putnam, D. F., and Chapman, L. J., Scientific Agriculture, Vol. 18, No. 8, April 1938.

# DRAINAGE SYSTEM

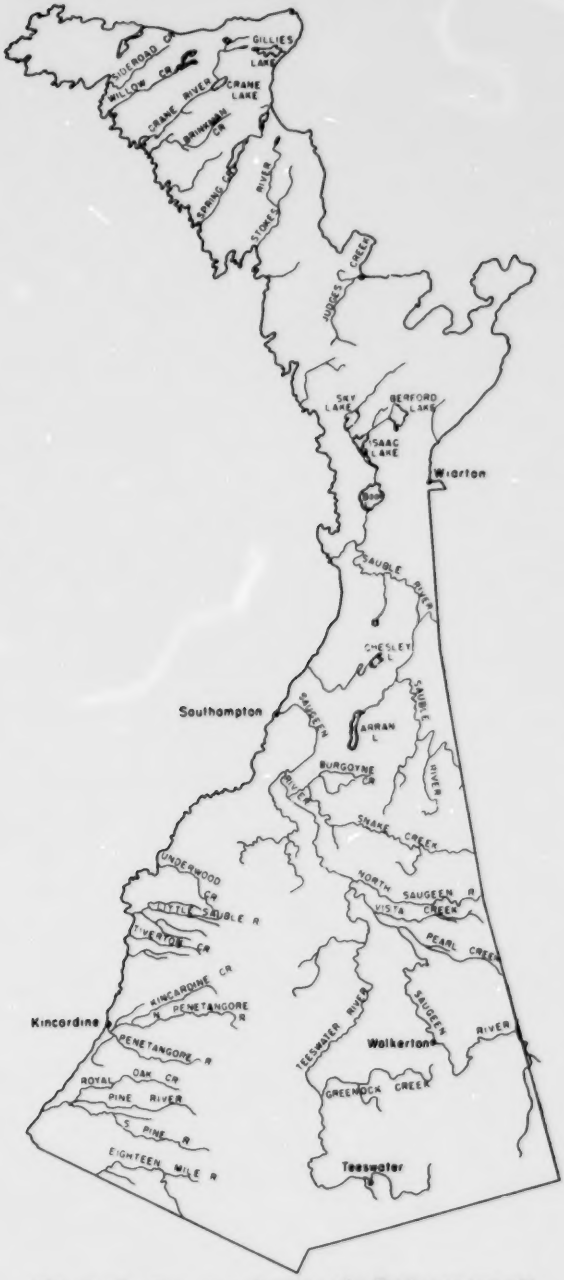



***FIG. 7—Outline map showing the Drainage system.***

Putnam and Chapman have divided Bruce County into two climatic regions, the Lake Huron-Georgian Bay region and the Western Uplands region. The Lake Huron-Georgian Bay region represents a narrow zone along the shore of Lake Huron and the whole of the Bruce Peninsula. The remainder of the County lies in the zone known as the Western Uplands.

## TABLE 5

### PRECIPITATION AT LUCKNOW AND OTHER SELECTED POINTS

| Month | Precipitation in Inches | | | | | |
|---|---|---|---|---|---|---|
| | Lucknow (47)* | Southampton (62) | Walkerton (22) | Tobermory (23) | Huntsville (30) | Kapuskasing (19) |
| December | 3.82 | 3.80 | 3.49 | 3.46 | 3.28 | 1.90 |
| January | 3.65 | 3.71 | 4.10 | 2.35 | 3.09 | 2.00 |
| February | 2.68 | 2.79 | 2.87 | 1.81 | 2.45 | 1.81 |
| Winter | 10.15 | 10.30 | 10.46 | 7.62 | 8.82 | 5.71 |
| March | 2.41 | 2.64 | 2.78 | 1.85 | 2.78 | 1.56 |
| April | 2.57 | 2.29 | 2.91 | 2.55 | 2.09 | 1.82 |
| May | 3.04 | 2.54 | 3.00 | 2.50 | 2.85 | 2.12 |
| Spring | 8.02 | 7.47 | 8.69 | 6.90 | 7.72 | 5.52 |
| June | 2.69 | 2.53 | 3.09 | 2.69 | 3.69 | 2.33 |
| July | 2.99 | 2.27 | 3.00 | 1.87 | 2.96 | 3.43 |
| August | 2.61 | 2.33 | 2.68 | 2.02 | 2.70 | 2.94 |
| Summer | 8.29 | 7.13 | 8.77 | 6.58 | 9.35 | 8.70 |
| September | 3.26 | 2.93 | 3.27 | 2.15 | 3.84 | 3.54 |
| October | 3.71 | 3.15 | 3.58 | 3.28 | 3.44 | 2.80 |
| November | 3.91 | 3.56 | 3.67 | 3.25 | 3.24 | 2.39 |
| Fall | 10.88 | 9.64 | 10.52 | 9.68 | 10.52 | 8.73 |
| ANNUAL | 37.34 | 34.54 | 38.44 | 30.78 | 36.41 | 27.59 |
| May 1 to Oct. 1 | 18.30 | 15.75 | 18.62 | 15.51 | 19.48 | 17.16 |

*Years of observation.

## TABLE 6

### TEMPERATURE AT LUCKNOW AND OTHER SELECTED POINTS

| Month | Temperature in Degrees Fahrenheit | | | | | |
|---|---|---|---|---|---|---|
| | Lucknow (47)* | Southampton (62) | Walkerton (22) | Tobermory (23) | Huntsville (30) | Kapuskasing (19) |
| December | 25 | 27 | 25 | 26 | 19 | 6 |
| January | 20 | 21 | 20 | 21 | 14 | —2 |
| February | 18 | 19 | 19 | 19 | 12 | 2 |
| Winter | 21 | 23 | 22 | 23 | 15 | 2 |
| March | 27 | 27 | 29 | 27 | 24 | 14 |
| April | 41 | 39 | 41 | 39 | 39 | 31 |
| May | 53 | 51 | 52 | 49 | 52 | 46 |
| Spring | 40 | 39 | 40 | 38 | 38 | 30 |
| June | 62 | 60 | 63 | 59 | 61 | 57 |
| July | 67 | 66 | 67 | 68 | 66 | 62 |
| August | 65 | 65 | 65 | 66 | 64 | 60 |
| Summer | 65 | 64 | 65 | 64 | 63 | 59 |
| September | 59 | 59 | 59 | 59 | 57 | 51 |
| October | 47 | 48 | 48 | 47 | 45 | 39 |
| November | 35 | 37 | 36 | 36 | 32 | 22 |
| Fall | 47 | 48 | 48 | 47 | 45 | 37 |
| ANNUAL | 43 | 43 | 44 | 43 | 41 | 32 |
| May 1 to Oct. 1 | 59 | 58 | 59 | 58 | 57 | 52 |

*Years of observation.

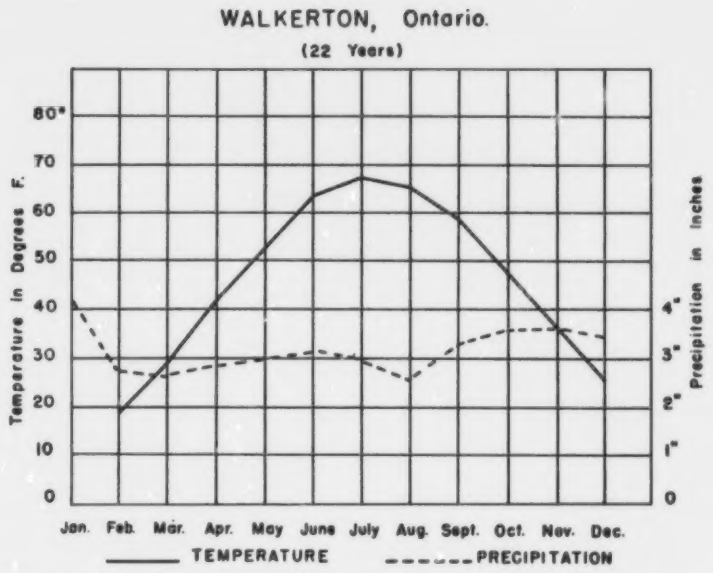



*FIG. 8—Diagram showing mean monthly temperature and precipitation for Walkerton.*

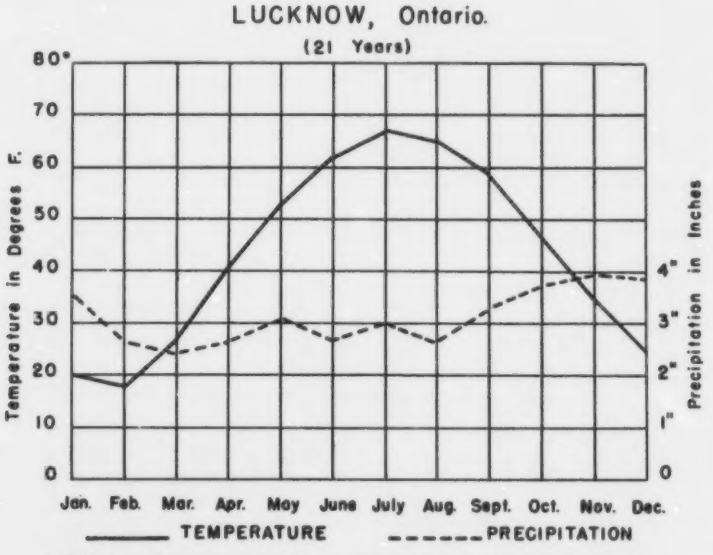



*FIG. 9—Diagram showing mean monthly temperature and precipitation for Lucknow.*

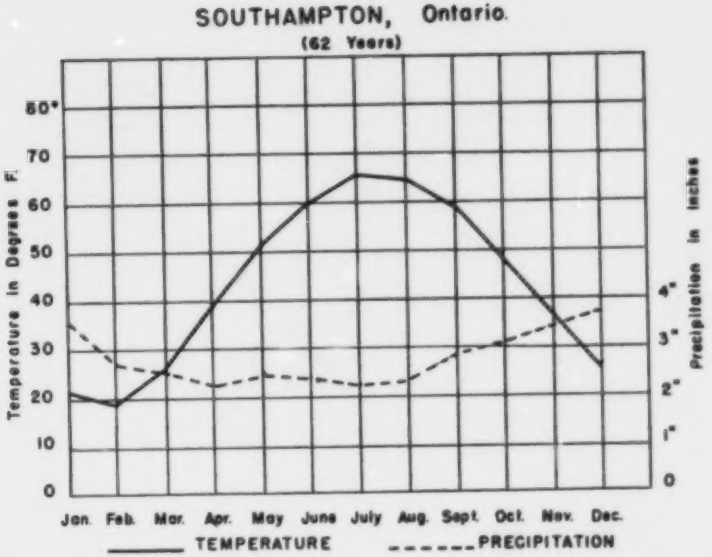



*FIG. 10—Diagram showing mean monthly temperature and precipitation for Southampton.*

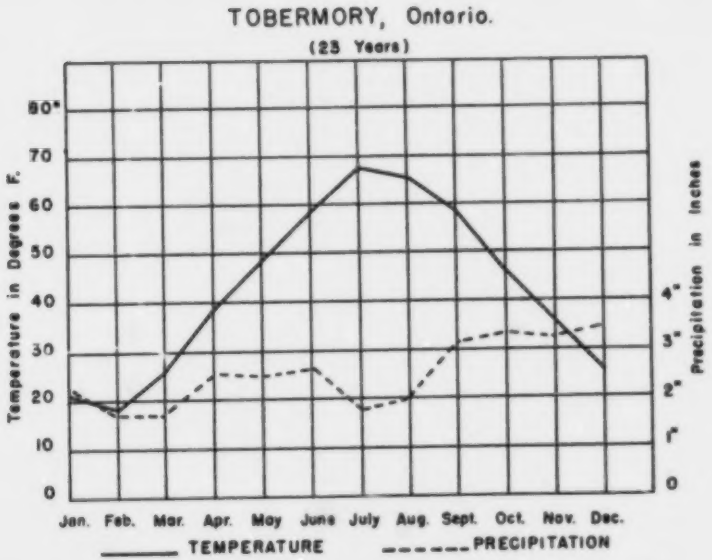



*FIG. 11—Diagram showing mean monthly temperature and Precipitation for Tobermory.*

The climate of the part of Bruce County in the Lake Huron-Georgian Bay region is slightly modified by the presence of Lake Huron and Georgian Bay. The winter temperature is 23°F and spring temperature ranges from 38°F to 39°F. Summer temperatures are usually 64°F while fall temperatures average between 47°F and 48°F. The frost-free period is approximately 147 days and the growing season varies from about 186 days at Tobermory to 196 days at Kincardine. The annual rainfall varies from about 31 inches in the north to 35 inches in the south and the annual snowfall varies from 80 to 110 inches.

The part of Bruce County in the Western Uplands region does not enjoy the moderating influence of the Lake and has a lower winter temperature and a slightly higher summer temperature than the Lake Huron-Georgian Bay region. The mean annual temperature is 44°F and the summer temperature is 65°F. The average length of frost-free period is from 130 to 140 days. The growing season varies from 182 days to 195 days, being shortest in the northern part of the County. The mean annual precipitation is approximately 36 inches, over half of which falls during the period of May 1 to October 1. Snowfall varies from 100 to 120 inches.

From the above data it would seem that the amount and distribution of rainfall is satisfactory for general farm crops. There is little likelihood of drought and the weather is usually favorable during the harvesting season.

**TABLE 7**

**DIFFERENCES BETWEEN THE TWO CLIMATIC REGIONS IN BRUCE COUNTY**

| | Lake Huron-Georgian Bay | Western Uplands |
|---|---|---|
| Mean Annual Precipitation | 31 to 35 inches | 38 inches |
| Mean Annual Temperature | 43° | 43° to 44° |
| Length of Growing Season | 186 to 200 days | 182 to 195 days |
| Frost Free Period | 147 days | 130 to 140 days |
| Snowfall | 80 to 110 inches | 100 to 120 inches |

### Natural Forest Vegetation

The type of natural vegetation found in any area is caused by the climate and the soil producing environmental conditions suitable for plant growth. Once the vegetation becomes established it exerts considerable influence on soil formation.

In classifying and mapping soils, those features which can be observed in the profile are used as criteria for making type separations. It is impossible to determine to what extent such features have been influenced by vegetation since it is only one of several soil forming factors. Neither is it the purpose of the soil survey to make a vegetation survey nor present a plant ecology report of an area. However, a study of the natural vegetation in an area is desirable so that the soil profile may be more carefully interpreted.

Certain associations of trees occur more frequently on some soils than on others. According to Halliday* Bruce County is included in the Huron-Ontario section of the Great Lakes-St. Lawrence Forest Region. In this section the prevailing association is broad-leaved, with sugar maple and beech dominant. With them are basswood, white elm, yellow birch, white ash and some red maple. Small groups of hemlock, balsam fir and the occasional white pine

*Halliday, W. E. D., A Forest Classification of Canada, Forest Service Bulletin No. 89.

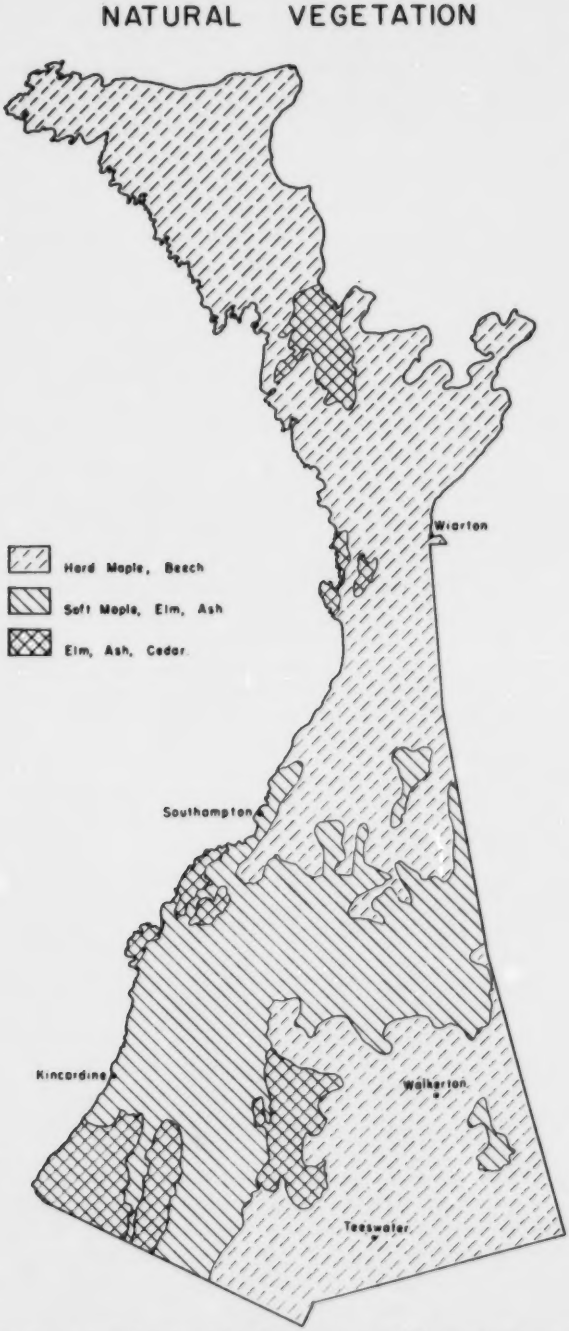
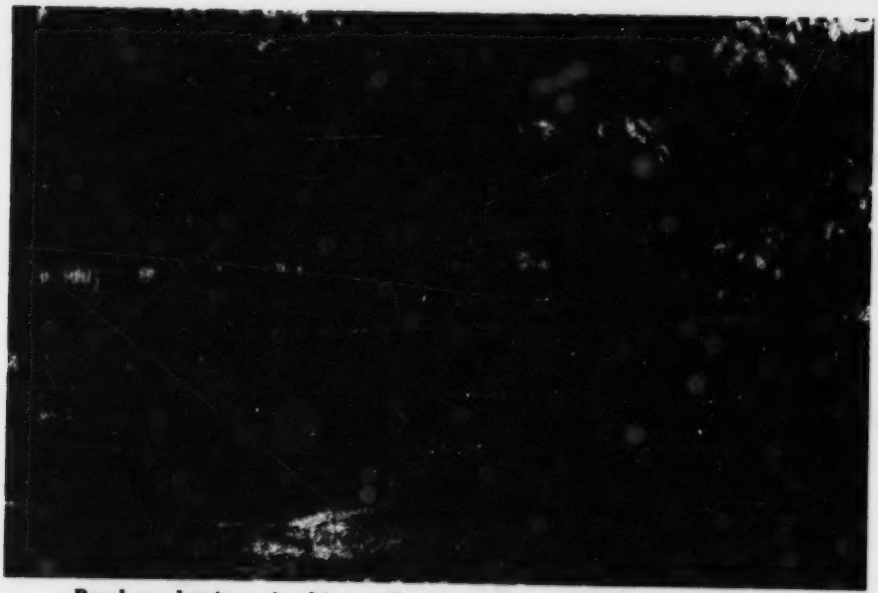



*FIG. 12—Outline map showing the distribution of the main forest associations.*

occur within the section as well as a scattering of aspen, hickory, ironwood and black cherry. Silver maple, slippery and rock elm and black ash occur on specialized sites such as river bottoms and swamps. White and red pine stands are found on lighter soils and Eastern white cedar in the swampy depressions. After fires, aspen and white birch often form secondary associations. The distribution of the main forest associations is shown in Figure 12. The associations most commonly found include:

**1. Sugar Maple — Beech Association**

The sugar maple-beech association occurs on well drained soils formed on coarse and medium textured till and on well drained soils formed on outwash materials. The association is also dominant on the well drained locations on the Breypen land type. A secondary growth of silver birch and poplar is commonly found growing on the coarse textured well drained soils after the original sugar maple-beech vegetation has been removed.



***Beech predominate in this woodlot located on well drained outwash soil. The hard maple have been cut out.***

**2. Soft Maple — Elm — Ash Association**

This association is dominant on the well drained, fine textured soils and on all the imperfectly drained soils. Other species found in small numbers include basswood, hemlock and ironwood.

**3. Elm — Ash — Cedar Association**

The elm-ash-cedar association occurs on the poorly and very poorly drained soils. Large numbers of Eastern white cedar are usually found in the swampy depressions. Tamarack often occur on the coarse textured poorly drained soils and poplar are present on the fine and medium textured poorly drained soils.

# PART III

## THE CLASSIFICATION AND DESCRIPTION OF BRUCE COUNTY SOILS

The characteristics of the soil depend on certain factors which cause soil differences. The more important of these factors are: (1) the physical and mineralogical composition of the parent material, (2) the climate occurring since the accumulation of the parent material, (3) the plant and animal life in the soil, (4) the relief, and (5) the length of time these factors have acted on the material. During the process of formation there have developed in the soil different layers which can be observed in a vertical cross section of the soil to a depth of about three feet. This cross section, including part of the underlying parent material, is referred to as the soil profile and the individual layers are called horizons of the profile. In Bruce County the kind and number of horizons found in the soil profile and the sequence in which they occur vary greatly among the different soils.

Three distinct kinds of profile occur in the Bruce County area, each representing what is called a Great Soil Group. Soils characteristic of the Grey-Brown Podzolic, Brown Forest and the Dark Grey Gleisolic Great Soil Groups are dominant in the County.

The Grey-Brown Podzolic soils are the dominant well drained soils in the area. They have developed from calcareous materials and have the following profile characteristics. Under forest they may have a layer of partially decomposed litter from deciduous trees. The surface soil ($A_1$ horizon) is generally 3 to 4 inches thick, is dark greyish brown to very dark brown in colour, moderately friable, slightly to moderately acid and moderately high in organic matter. This horizon consists of a close mixture of mineral and organic materials. The surface or $A_1$ horizon is underlain by a yellowish brown, pale brown or brownish grey $A_2$ horizon which is comparatively low in organic matter and slightly to moderately acid in reaction. The thickness of the $A_2$ horizons may vary considerably in different soils. In the medium and coarse textured soils the upper part of the $A_2$ horizon is more intensely coloured and is designated as the $A_{21}$ horizon, while the lower more greyish part is designated as the $A_{22}$ horizon.

Under the $A_2$ horizon lies the B horizon. This layer is darker brown in colour than the $A_2$ and it contains more clay and sesquioxides than any other horizon in the profile. It is generally slightly acid to neutral in reaction. The B horizon may be subdivided into a transitional subhorizon to the $A_2$ which is designated as the $B_1$ horizon and the main or $B_2$ horizon which contains most of clay and sesquioxides which have been leached from the A horizons. The B horizon rests upon the unaltered or only slightly weathered calcareous parent material. The following is a generalized profile description of a Grey-Brown Podzolic Soil:

$A_0$ — Accumulated layer of partially decomposed litter from deciduous trees.

$A_1$ — Dark greyish brown to a very dark brown mineralized humus layer.

$A_{21}$— Dark yellow-brown layer.

$A_{22}$— Pale brown layer.

$B_2$ — Dark brown layer.

C — Light greyish brown calcareous parent material.

In many of the Grey-Brown Podzolic soils of Ontario there is a tendency for a secondary profile to develop in the A horizons of the Grey-Brown Podzolic soils. Generally this secondary development is evidenced by the establishment of a definite leaf mat or $A_0$ horizon, a thinning out of the dark coloured $A_1$ horizon and the development of a distinct brownish colour in the upper part of the $A_2$ horizon. This secondary profile in the upper part of the soil resembles the Brown Podzolic soils in its morphological characteristics. However in some of the coarser textured sandy soils a distinct light grey $A_2$ horizon, similar to those found in Podzol soils occurs below the thin $A_1$ or $A_0$ horizon. These secondary profiles can best be observed under virgin conditions as the distinguished features are readily destroyed on cultivation.

Closely associated with the Grey-Brown Podzolic soils are areas of Brown Forest soils in which the leaching has not been very marked. These soils are found in the northern part of the County. The well drained Brown Forest soils in the area have a thin organic mat ($A_0$ horizon) on the surface consisting of leaf litter and semi-decomposed organic matter. The $A_1$ horizon is usually 3 to 4 inches thick dark grey in colour, friable and of granular structure. It is underlain by a brown B horizon which gradually grades into the pale brown parent material. The reaction of the A horizon is approximately neutral while the B horizon is slightly alkaline. In many instances the Brown Forest profiles in Bruce County show indications of weak Grey-Brown Podzolic development. In such soils there is a slight indication of the development of a brownish grey $A_2$ horizon under the $A_1$ and there is a noticeable increase in the clay content of the $B_2$ horizon which is not characteristic of modal Brown Forest soils. Since it is evident that certain Grey-Brown Podzolic characteristics are present in the Brown Forest soils it would appear that the Brown Forest soils of Bruce County are best correlated as Brown Forest—Grey-Brown Podzolic Intergrades. A generalized profile description of a Brown Forest Soil follows:

$A_0$ — Accumulated layer of partially decomposed litter from deciduous trees.

$A_1$ — Dark grey to dark greyish brown mineralized layer.

B — Dark yellowish brown layer.

C — Light yellowish brown, calcareous, parent material.

A large proportion of the soils in the surveyed area have developed under poorly drained conditions. The poorly drained soils of Bruce County are representative of the following Great Soil Groups: Dark Grey Gleisolic soils, Bog soils and Alluvial (young) soils.

The Dark Grey Gleisolic soils have a dark, friable, granular surface layer, generally 4 to 6 inches thick which is underlain by a mottled brownish grey subsoil that gradually grades into the parent material. In comparison to the well drained soils that have uniformly brownish or yellowish brown subsoils the poorly drained soils have rusty specks and streaks and bluish grey colours in the subsoil. The discoloration or mottling of the subsoil is one of the distinguishing features of poorly drained soils. The Dark Grey Gleisolic soils generally do not have a marked leached layer or layer of accumulation. The following is a generalized description of a Dark Grey Gleisolic soil:

$A_0$ — Accumulated layer of partially decomposed litter from deciduous trees.

$A_1$ — Dark grey to very dark grey mineralized layer.

G — Brownish grey, mottled mineral layer.

C — Greyish brown parent material.

The Bog soils consist of organic accumulation one to three feet and more in depth. They may differ according to the degree of decomposition of the organic materials from which the soils have developed. The well decomposed dark Bog soils are referred to as "Muck" and the poorly decomposed organic materials as "Peat." The Bog soils have formed under very poorly drained conditions and frequently occupy depressional areas which receive considerable seepage.

The Alluvial soils consist of recently deposited material which has not been in place long enough for definite soil horizons to develop. However, layers differing in texture as a result of periodic flooding, can frequently be observed in the profile of these young alluvial soils.

The Dry Sands consist of sandy material of recent deposition which has not been exposed to soil forming processes long enough for profile characteristics to develop. The soils in the group are essentially loose sands with excessive drainage.

**System of Classification**

On the basis of their differentiating characteristics soils are grouped into categories which can be described and readily recognized. The three categories commonly used in mapping soils are series, type, and phase.

The soil series is a group of soils with genetic horizons similar in differentiating characteristics and arrangement in the soil profile and developed from a particular type of parent material. Except for texture, particularly in the $A_1$ horizon, the physical character and thickness of the horizons do not vary significantly within a series. Such characteristics include colour, structure, organic matter content, reaction, and texture.

The soil type is the principal unit of mapping and is most specific in character. The soil type name consists of a series name plus the textural class name derived principally from the texture of the $A_1$ horizon. Although the soil type unit is the most specific unit recognized in mapping soils it should be pointed out that it includes a range of conditions. The profile descriptions presented in the report do not represent a specific location but cover the average conditions most commonly found in the particular area. With mapping done on the scale of one inch to the mile it is often necessary to include small areas of other related soils in a delineated area with the dominant mapping unit. The variability within a mapping unit varies in the soil series. The range of characteristics tolerated within a series is discussed under the description of the various series.

A phase is a subdivision of a soil type used to show variations from the normal in topography, stoniness or erosion.

The soil series developed on similar parent material but differing in profile characteristics due to differences of relief or drainage are included in the soil catena.

## KEY TO THE SOILS OF BRUCE COUNTY

| | Acreage | % of Total |
|---|---|---|
| **A. Soils Formed from Coarse Open Calcareous Till** | | |
| I. Till composed of grey materials | | |
| (i) Good drainage | | |
| 1. Dumfries loam (G.B.P.) | 11,700 | 1.1 |
| (ii) Imperfect drainage | | |
| 1. Killean loam (G.B.P.) | 100 | .... |
| II. Till composed of yellow-brown materials | | |
| (i) Good drainage | | |
| 1. Osprey loam (B.F.–G.B.P.) | 800 | .... |
| **B. Soils Formed from Medium Textured Calcareous Till** | | |
| (i) Good drainage | | |
| 1. Harriston loam (G.B.P.) | 79,900 | 7.5 |
| 2. Harriston silt loam (G.B.P.) | 2,000 | 0.2 |
| 3. Harkaway silt loam (B.F.–G.B.P.) | 10,100 | 1.0 |
| 4. Harkaway silt loam — stony phase (B.F.–G.B.P.) | 43,700 | 4.1 |
| 5. Harkaway loam (B.F.–G.B.P.) | 1,700 | 0.1 |
| 6. Harkaway loam — stony phase (B.F.–G.B.P.) | 3,800 | 0.3 |
| (ii) Imperfect drainage | | |
| 1. Listowel loam (G.B.P.) | 16,900 | 1.6 |
| 2. Listowel silt loam (G.B.P.) | 6,400 | 0.6 |
| 3. Listowel loam — stony phase (G.B.P.) | 1,900 | 0.1 |
| 4. Wiarton loam (B.F.–G.B.P.) | 3,500 | 0.3 |
| 5. Wiarton silt loam (B.F.–G.B.P.) | 1,600 | 0.3 |
| (iii) Poor drainage | | |
| 1. Parkhill loam (D.G.G.) | 8,400 | 0.8 |
| 2. Parkhill silt loam (D.G.G.) | 2,600 | 0.2 |
| **C. Soils Formed from Fine Textured Limestone and Shale Till** | | |
| (i) Good drainage | | |
| 1. Huron clay loam (G.B.P.) | 9,600 | 0.9 |
| 2. Huron silt loam (G.B.P.) | 4,900 | 0.4 |
| 3. Vincent clay loam (B.F.–G.B.P.) | 900 | .... |
| 4. Vincent silt loam (B.F.–G.B.P.) | 600 | .... |
| (ii) Imperfect drainage | | |
| 1. Perth clay loam (G.B.P.) | 53,300 | 5.0 |
| 2. Perth silt loam (G.B.P.) | 14,600 | 1.4 |
| 3. Kemble clay loam (B.F.–G.B.P.) | 1,500 | 0.1 |
| 4. Kemble silt loam (B.F.–G.B.P.) | 600 | .... |
| (iii) Poor drainage | | |
| 1. Brookston clay loam (D.G.G.) | 60,200 | 5.7 |
| 2. Brookston silt loam (D.G.G.) | 2,000 | 0.1 |

| | Acreage | % of Total |
|---|---|---|
| **D. Soils Formed from Fine Textured Shale and Limestone Till** | | |
| (i) Good drainage | | |
| 1. Dunedin clay loam (B.F.–G.B.P.) | 2,700 | 0.2 |
| (ii) Imperfect drainage | | |
| 1. Craigleith clay loam (B.F.–G.B.P.) | 800 | .... |
| (iii) Poor drainage | | |
| 1. Morley clay loam (B.F.–G.B.P.) | 400 | .... |
| **E. Soils Formed from Glacio-Fluvial Materials** | | |
| I. Sandy materials | | |
| (i) Good drainage | | |
| 1. Waterloo sandy loam (G.B.P.) | 31,600 | 3.0 |
| II. Gravelly materials | | |
| (i) Good drainage | | |
| 1. Donnybrook sandy loam (G.B.P.) | 20,400 | 2.8 |
| **F. Soils Formed from Outwash Materials** | | |
| I. Sandy materials | | |
| (i) Excessive drainage | | |
| 1. Plainfield sand (D) | 15,200 | 1.4 |
| (ii) Good drainage | | |
| 1. Fox sandy loam (G.B.P.) | 20,700 | 1.9 |
| 2. Tioga sandy loam (P.–G.B.P.) | 7,100 | 0.6 |
| 3. Tioga sand (P.–G.B.P.) | 100 | .... |
| 4. Sullivan sandy loam (B.F.–G.B.P.) | 2,600 | 0.3 |
| 5. Sullivan sand (B.F.–G.B.P.) | 1,900 | 0.1 |
| (iii) Imperfect drainage | | |
| 1. Brady sandy loam (G.B.P.) | 17,400 | 1.6 |
| (iv) Poor drainage | | |
| 1. Granby sandy loam (D.G.G.) | 9,100 | 0.8 |
| II. Gravelly materials | | |
| (a) Pale brown in colour | | |
| (i) Good drainage | | |
| 1. Teeswater silt loam (G.B.P.) | 17,100 | 1.6 |
| 2. Sargent loam (B.F.–G.B.P.) | 5,300 | 0.5 |
| (b) Grey in colour | | |
| (i) Good drainage | | |
| 1. Burford loam (G.B.P.) | 10,500 | 1.0 |
| (ii) Imperfect drainage | | |
| 1. Brisbane loam (G.B.P.) | 1,600 | 0.1 |
| (iii) Poor drainage | | |
| 1. Gilford loam (D.G.G.) | 900 | .... |
| **G. Soils Formed from Shallow Sands Over Clay Till or Clay** | | |
| (i) Good drainage | | |
| 1. Bookton sandy loam (G.B.P.) | 400 | .... |
| (ii) Imperfect drainage | | |
| 1. Berrien sandy loam (G.B.P.) | 24,600 | 2.3 |
| (iii) Poor drainage | | |
| 1. Wauseon sandy loam (D.G.G.) | 7,200 | 0.6 |
| **H. Soils Formed from Lacustrine Materials** | | |
| (i) Good drainage | | |
| 1. Saugeen silty clay loam (B.F.–G.B.P.) | 28,200 | 2.7 |
| 2. Saugeen clay loam (B.F.–G.B.P.) | 1,300 | 0.1 |
| 3. Saugeen silt loam (B.F.–G.B.P.) | 8,900 | 0.8 |

| | | Acreage | % of Total |
|---|---|---|---|
| (ii) | Imperfect drainage | | |
| 1. | Elderslie silty clay loam (B.F.–G.B.P.) | 50,300 | 4.8 |
| 2. | Elderslie clay loam (B.F.–G.B.P.) | 5,800 | 0.5 |
| 3. | Elderslie silt loam (B.F.–G.B.P.) | 28,700 | 2.7 |
| (iii) | Poor drainage | | |
| 1. | Chesley silty clay loam (D.G.G.) | 24,900 | 2.3 |
| 2. | Chesley clay loam (D.G.G.) | 200 | .... |
| 3. | Chesley silt loam (D.G.G.) | 5,500 | 0.5 |
| 4. | Toledo clay loam (D.G.G.) | 300 | .... |
| 5. | Toledo silt loam (D.G.G.) | 900 | .... |
| 6. | Ferndale clay loam (D.G.G.) | 5,900 | 0.5 |
| 7. | Ferndale silt loam (D.G.G.) | 2,000 | 0.2 |
| **I.** | **Recent Alluvial Materials** | | |
| 1. | Bottom land (A) | 48,900 | 4.6 |
| **J.** | **Organic Soils** | | |
| (i) | Very poor drainage | | |
| 1. | Muck (B) | 66,900 | 6.3 |
| 2. | Marsh (B) | 1,500 | 0.1 |
| **K.** | **Miscellaneous Soils** | | |
| 1. | Eastport sand (D) | 3,100 | 0.3 |
| 2. | Eastport gravel (L) | 3,100 | 0.3 |
| 3. | Bridgman sand (D) | 1,500 | 0.1 |
| 4. | Breypen land type | 219,200 | 20.7 |

## GREAT SOILS GROUP

A. — Alluvial Soils
B.F.–G.B.P.—Brown Forest — Grey-Brown Podzolic Intergrade Soils
B. — Bog Soils
D. — Dry Sands
D.G.G. — Dark Grey Gleisolic Soils
G.B.P. — Grey-Brown Podzolic Soils
L. — Lithosols
P.–G.B.P. — Podzol — Grey-Brown Podzolic Intergrade Soils

## A. SOILS FORMED FROM COARSE OPEN TILL

The coarse open till soils are developed on stony limestone till derived from the underlying bedrock. The unweathered or slightly weathered drift contains many angular stones and many boulders interspersed among a sandy loam matrix. The materials are commonly associated with terminal moraines.

Two catenas make up the coarse open tills of Bruce County and are separated on the basis of differences in colour of the parent material and profile. The Dumfries catena is developed on grey limestone till and the Osprey catena is developed on yellowish brown limestone till. The Dumfries series is the well drained member of the Dumfries catena and belongs to the Grey-Brown Podzolic Great Soil Group. The only other member of the Dumfries catena mapped in Bruce County is the imperfectly drained Killean series which exhibits the characteristics of the Grey-Brown Podzolic soils. The Osprey is the only catenary member of the yellowish brown open till soils mapped in Bruce County. It exhibits the characteristics of the Brown Forest — Grey-Brown Podzolic Intergrade.

## I. Till Composed of Grey Materials

### *(i) Good Drainage*

### Dumfries Loam (11,700 acres)

The Dumfries series is the well drained member of the Dumfries catena and is found in the southern part of Carrick Township. The profile exhibits the characteristics of the Grey-Brown Podzolic Great Soil Group. The following is a profile description of Dumfries loam developed under hardwood vegetation:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–3 inches loam; dark brown (10 YR 4/3); fine granular structure; friable consistency; frequent stones; pH — 6.5.

$A_{21}$— 3–11 inches loam; yellowish brown (10 YR 5/4); weak platy structure; friable consistency; few stones; pH — 6.3.

$A_{22}$— 11–14 inches loam; pale brown (10 YR 6/3); weak platy structure; friable consistency; occasional stones; pH — 6.0.

$B_1$ — 14–20 inches loam; dark yellowish brown (10 YR 4/4); fine nuciform structure; friable consistency; moderately stony; pH — 6.5.

$B_2$ — 20–27 inches clay loam; dark brown (10 YR 4/3); medium nuciform structure; friable consistency; very stony; pH — 7.0.

C — Stony sandy loam till; light grey (10 YR 7/2); single grain structure; loose consistency; calcareous; pH 8.0.

The topography of Dumfries loam is steeply sloping, the slopes being irregular. Both external and internal drainage are good. However, imperfectly and poorly drained potholes which are too small to be delineated on the map, the scale of which is one inch to the mile, occur, which are included with the well drained member. Stones occurring throughout the profile usually interfere with cultivation. The soil is susceptible to sheet erosion which is severe in many sections. Dumfries loam has a medium to low fertility level, being low to very low in phosphorus and medium to low in potash and nitrogen. The organic matter content is medium to low.

Most of the Dumfries loam has been cleared and present forested areas consist of small woodlots. Beech and sugar maple occur most frequently, with basswood, ironwood and elm occurring in lesser amounts.

#### Agriculture

Most of the Dumfries loam has been cultivated and is used chiefly for general farming. Cereal grains, legumes, hay and pasture are fairly well adapted to this soil.

***Stones in the Dumfries profile usually interfere with cultivation.***

The loamy texture and porous nature of the parent material permit early cultivation. Erosion and the large number of stones occurring throughout the profile are the greatest hazards to cultivation. Since the steep irregular slopes prohibit the use of special conservation practices such as contour plowing, long rotations should be used to prevent erosion. The steeper slopes would be better left under a permanent cover of grass or trees.

The type is well supplied with lime and suited to the growing of legumes. This is particularly desirable in areas where cattle are raised for dairying or beef, since large amounts of forage crop materials are needed.

This soil requires additions of barnyard manure and fertilizers high in phosphorus and nitrogen.

### *(ii) Imperfect Drainage*

#### Killean Loam (100 acres)

Killean loam is the imperfectly drained member of the Dumfries catena. It is developed on limestone till materials and is a Grey-Brown Podzolic soil. A commonly occurring Killean loam profile exhibits the following characteristics:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–5 inches loam; very dark greyish brown (10 YR 3/2); fine granular structure; friable consistency; frequent stones; pH — 6.8.

$A_2$ — 5–12 inches loam; yellowish brown (10 YR 5/4); slightly mottled; weak platy structure; friable consistency; few stones; pH — 6.4.

$B_2$ — 12–20 inches loam; dark brown (10 YR 4/3); mottled; medium nuciform structure; friable consistency; very stony; pH — 7.0.

C — Stony sandy loam till; pale brown; (10 YR 6/3); single grain structure; loose consistency; many stones and boulders; calcareous; pH — 7.4.

**Agriculture**

A large proportion of Killean loam is used for general farming and pasture land. When stones are removed the soil is fairly well suited to the production of cereal grains, hay and pasture. However, legumes, particularly alfalfa, are not tolerant of the imperfect drainage conditions.

It should respond to improved drainage conditions but the cost of installation might be high in areas where it is difficult to procure outlets.

The type is well supplied with lime but requires additions of commercial fertilizer and barnyard manure to maintain fertility levels.

**II. Till Composed of Yellow-Brown Materials**

***(i) Good Drainage***

**Osprey Loam (800 acres)**

The Osprey series is developed on stony till, yellowish brown in colour, and occurs in small areas in the northern part of the County. It is a Brown Forest — Grey-Brown Podzolic soil and may be described as follows:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–3 inches loam; very dark brown (10 YR 2/2); fine granular structure; friable consistency; moderately stony; pH — 7.2.

$B_1$ — 3–8 inches loam; dark brown; (7.5 YR 3/2); weak nuciform structure; friable consistency; few stones; pH — 7.4.

$B_2$ — 8–15 inches loam; dark reddish brown (5 YR 3/3); fine nuciform structure; friable consistency; very stony; slightly calcareous; pH — 7.6.

C — Stony sandy loam till; light yellowish brown (10 YR 6/4); single grain structure; loose consistency; very stony; calcareous; pH — 8.0.

In some of the Osprey loam thin weakly developed $A_2$ and $B_1$ horizons may be found. The topography of the Osprey loam consists of steep irregular slopes that are very susceptible to erosion. Similar to the Dumfries series, both external and internal drainage are good, but imperfectly and poorly drained potholes, too small to be delineated on the map, the scale of which is one inch to the mile, occur, and are included with the well drained member. The fertility level is low, the soil having a low phosphorus content, a medium to low potassium and nitrogen content, and a low content of organic matter.

Present forested areas consist of small woodlots in which beech and sugar maple are the most frequently occurring species. Basswood, elm, ash and ironwood are present in lesser amounts.

**Agriculture**

The Osprey series is used chiefly for general farming, with crops such as oats, mixed grains, alfalfa, red clover and timothy being most commonly grown.

Erosion and stoniness are the greatest hazards to cultivation. Long rotations are most satisfactory in preventing erosion since the irregular slopes prohibit the use of special practices such as contour plowing. The steeper slopes are better left under a permanent cover of grass or trees.

The porous nature of the materials permits rapid percolation of moisture, which allows early spring cultivation. The type is well supplied with lime and is suited to the growing of legumes, but requires additions of fertilizer high in phosphorus, potassium and nitrogen.

## B. SOILS FORMED FROM MEDIUM TEXTURED TILL

The medium textured till soils have developed on loamy calcareous till derived from the underlying bedrock. The materials are commonly associated with drumlins or ground moraines.

Two Great Soil Groups are represented in the medium textured till soils found in Bruce County. The Grey-Brown Podzolic Great Soil Group is represented by the Harriston series and the Brown Forest Great Soil Group is represented by the Harkaway series. Some of the Harkaway soils have weakly developed characteristics of the Grey-Brown Podzolic soils, and hence the Harkaway soils are treated as Brown Forest — Grey-Brown Podzolic Intergrades.

The Harriston series is the well drained member of the Harriston catena and the Listowel and Parkhill series are the imperfectly and poorly drained members respectively. The well drained member of the Harkaway catena is the Harkaway series and the Wiarton series is the imperfectly drained member. The morphological characteristics of the poorly drained member are similar to those of the poorly drained member of the Harriston catena. For this reason the poorly drained member of the Harkaway catena has been included in the Parkhill series.

### (i) *Good Drainage*

#### Harriston Loam (79,900 acres)

Formed from loamy calcareous till, the Harriston series is found in the townships of Carrick, Culross and Brant and exhibits the characteristics of the Grey-Brown Podzolic Great Soil Group.

A virgin profile, developed under hardwood vegetation, exhibits the following characteristics:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–4 inches loam; dark greyish brown (10 YR 3/2); fine granular structure; friable consistency; few stones; pH — 6.7.

$A_{21}$ — 4–17 inches loam; yellow-brown (10 YR 5/4); weak platy structure; friable consistency; stone-free; pH — 6.6.

$A_{22}$ — 17–20 inches loam; pale brown (10 YR 6/3); weak platy structure; friable consistency; stone-free; pH — 6.4.

$B_2$ — 20–30 inches clay loam; brown (10 YR 4/3); medium nuciform structure; firm consistency; few stones; pH — 7.0.

C — Loam till; light yellowish brown (10YR 6/4); medium nuciform structure; hard consistency; moderately stony; pH — 7.8.

Harriston loam, with its smooth moderate slopes, has good external and internal drainage and has developed under vegetation similar to that of the Dumfries series. The most commonly occurring trees are hard maple, beech, basswood and ironwood. When exposed, this soil is susceptible to sheet erosion, and chemical tests show it to be fairly well supplied with plant nutrients.

**Agriculture**

The Harriston loam is well suited to dairy, beef, or general farming and some good farms have been established on this type. Most farm crops commonly grown in Bruce County are produced with reasonably good success. Cereal grains, alfalfa, hay, pasture and turnips produce good yields on Harriston soils.

Where livestock are kept, the use of forage crops and barnyard manure provides the basis for an effective and sound erosion control program. A large proportion of the land has been cleared and is in regular crop rotation.

Harriston soils are generally low in phosphorus, medium in potassium and medium to low in nitrogen. Additions of fertilizers and manure are required so that the fertility level of these soils can be increased and maintained.

### Harriston Silt Loam (2,000 acres)

Harriston silt loam differs from the loam chiefly in surface texture. The presence of a slightly higher content of fine materials gives the Harriston silt loam a somewhat higher level of natural fertility than the Harriston loam.

### Harkaway Silt Loam (10,100 acres)

Harkaway silt loam is found in the northern part of the County where it is associated with the drumlinized land and has a smooth, moderately sloping

topography. The profiles generally have the characteristics of the Brown Forest Great Soil Group. However, sufficient Grey-Brown Podzolic characteristics are present to necessitate the placing of these soils in the Brown Forest — Grey-Brown Podzolic Intergrade.

The following profile description illustrates the characteristics of Harkaway silt loam:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–5 inches silt loam; very dark brown (10 YR 2/2); fine granular structure; friable consistency; moderately stony; pH — 7.2.

$B_1$ — 5–9 inches silt loam; brown (10 YR 5/3); medium nuciform structure; friable consistency; moderately stony; pH — 7.2.

$B_2$ — 9–15 inches silt loam; yellowish brown (10 YR 5/4); medium nuciform structure; firm consistency; moderately stony; pH — 7.3.

C — Loam till; pale brown (10 YR 6/3); weak platy structure; moderately stony; calcareous; pH — 8.0.

In some localities the profile resembles to some extent that of the Harriston series, having a thin $A_2$ horizon, a finer textured B horizon, and a slightly deeper solum.

The topography is usually smooth, moderately sloping, but steep slopes occur where the land has been dissected by streams. The tree cover found in existing woodlots consists mainly of sugar maple and beech. When these trees are cleared off and the land is allowed to go back to trees, a second growth of poplar and silver birch becomes established. The porous materials and the sloping topography permit good external and internal drainage. The soil is susceptible to erosion and the surface is often stony, boulders being present in variable numbers.

**Agriculture**

Most of the Harkaway silt loam has been cleared and is used chiefly for general farming. The soil is well suited to the production of oats, mixed grain, alfalfa, hay and pasture. Certain specialized crops such as tree fruits do not produce good yields because of the cool climate.

The natural fertility of the Harkaway soils is fair, having amounts of phosphorus and potassium similar to those of the Harriston soils. Erosion presents a problem and is severe where the steeper slopes are cultivated, but it can be well controlled if the slopes are left in woods or grass. Contour plowing, strip cropping or long rotations can be used to prevent erosion on the more moderate slopes. Early cultivation is possible on these soils because of the porous nature of the materials which allow rapid percolation of water.

### Harkaway Silt Loam—Stony Phase (43,700 acres)

Most Harkaway silt loam is more stony than that described above and it has been mapped as a stony phase. The profile is similar to that of the less stony silt loam but there are many more stones throughout the profile.

The presence of surface stone and the large quantity of stone in the profile make clearing a tedious process. However, much of the land has been cleared and is under cultivation. The use of the soil is conditioned by the amount of stones on the surface. Where the stones have been removed the soil is used for the same agricultural endeavours as the Harkaway silt loam described above. Cleared areas where the stones have not been removed are used for pasture and grazing land.

### Harkaway Loam (1,700 acres)

This soil occurs in the neighbourhood of Tara. The profile of this type resembles that of the Harkaway silt loam but the surface horizons have a loam texture. The land use and soil management is similar to that of the Harkaway silt loam.

### Harkaway Loam—Stony Phase (3,800 acres)

The stony phase of the Harkaway loam has similar profile characteristics to the Harkaway loam except for a larger number of stones. Although stoniness makes this land difficult to clear, most of it is cultivated and crops are grown amongst the stone piles. This soil has the same management problems as the stony phase of the Harkaway silt loam.

#### (*ii*) *Imperfect Drainage*

### Listowel Loam (16,900 acres)

The Listowel loam is the imperfectly drained member of the Harriston catena, and the Harriston and Listowel soils generally occur in close association forming an intimate land pattern. The horizons in the Listowel are not as

***The use of the stony phase of the Harkaway series is conditioned by the number of stones on the surface.***

well defined as those of the Harriston series but the profile exhibits characteristics of a weakly developed Grey-Brown Podzolic soil. The following characteristics are those exhibited by Listowel loam:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–5 inches loam; very dark greyish brown (10 YR 3/2); fine granular structure; friable consistency; few stones; pH — 6.8.

$A_2$ — 5–12 inches loam; yellowish brown (10 YR 5/6); mottled; weak platy structure; friable consistency; few stones; pH — 6.5.

$B_2$ — 12–21 inches clay loam; dark brown (10 YR 4/3); mottled; medium nuciform structure; friable consistency; stony; pH — 7.2.

C — Loam till; pale brown (10 YR 6/3); medium nuciform structure; hard consistency; stony; calcareous; pH — 7.8.

The internal and external drainage is imperfect and the topography is smooth, gently sloping. Stones occur in varying proportions and in some instances may interfere with cultivation. There has been practically no erosion on the type. Tree growth in existing woodlots consists mainly of soft maple and elm.

**Agriculture**

Listowel loam is used largely for general farming. Where the soil is drained cereal grains and other crops adapted to the region, do well. When left in the undrained state the land is mainly used for pasture or crops more tolerant of the imperfect drainage conditions. The organic matter content is medium and the soil is well supplied with lime. Low phosphorus levels should be raised by the use of phosphatic fertilizers.

### Listowel Silt Loam (6,400 acres)

Associated with the Listowel loam are areas in which the surface layers are silt loam in texture. Except for the texture of the surface layers the profile characteristics for the Listowel loam and silt loam are similar. The Listowel silt loam has about the same crop value as the loam but may have a slightly higher natural fertility.

### Listowel Loam—Stony Phase (1,900 acres)

The stony phases of Listowel loam occur near the lakeshore in Bruce and Saugeen Townships. The profile is similar to that of the Listowel loam except for the large number of stones which occur on the surface and throughout the profile. Most of the area is under tree cover and the small areas which are cleared are used for rough pasture. Practically none of this phase is under cultivation.

### Wiarton Loam (3,500 acres)

The Wiarton soils occur chiefly in the Wiarton district and are developed on the same materials as the Harkaway series. Wiarton loam is the imperfectly drained member of the Harkaway catena and is a Brown Forest — Grey-Brown Podzolic soil. A common Wiarton loam profile exhibits the following characteristics:

$A_0$ — Thin layer of partially decomposed twigs, leaves, etc.

$A_1$ — 0–6 inches loam; very dark grey-brown (10 YR 3/2); medium granular structure; friable consistency; moderately stony; pH — 7.2.

$B_2$ — 6–12 inches loam; brown (10 YR 5/3); mottled; medium nuciform structure; firm consistency; moderately stony; pH — 7.4.

C — Loam till; pale brown (10 YR 6/3); fine platy structure; hard consistency; moderately stony; calcareous; pH — 8.0.

As in the Harkaway soils, a thin $A_2$ horizon and a finer textured B horizon may be present in the Wiarton profiles. The topography of the Wiarton series is smooth, gently sloping. External drainage is low and internal drainage is moderate. The natural vegetation consists principally of hardwoods — elm and soft maple being the dominant species with silver birch, poplar and ash also occurring.

#### Agriculture

Wiarton soils support a certain amount of general farming and are best suited to the growing of oats, hay and pasture. Red clover and alsike produce good crops on these soils and should be included in the rotation. A wider range of crops can be grown when drainage is improved.

Stones often occur in sufficiently large numbers to interfere with cultivation. The Wiarton soils are well supplied with lime but are low in phosphate, medium in potash and medium in nitrogen, and fertilizer should be used if good yields are to be obtained.

### Wiarton Silt Loam (1,600 acres)

This type occurs in small scattered areas in northern Bruce County, and is associated with the Wiarton loam. The profile differs from the Wiarton loam only in the texture of the surface horizons. The type is used similarly to the Wiarton loam but crop yields are often somewhat higher.

#### *(iii) Poor Drainage*

### Parkhill Loam (8,400 acres)

Parkhill loam is mapped in association with the Harriston, Harkaway, Listowel, and Wiarton soils and usually occurs in very gently sloping to depressional areas. It is the poorly drained member of the Harriston and Harkaway catenas. The Parkhill series has also been mapped in many other counties in

Ontario as the poorly drained member of other soil catenas developed on loamy limestone till. The soil belongs to the Dark Grey Gleisolic Great Soil Group and exhibits the following profile characteristics:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–7 inches loam; very dark brown (10 YR 2/2); fine granular structure; friable consistency; few stones; pH — 7.0.

G — 7–16 inches loam; greyish brown (10 YR 5/2); mottled; massive structure; friable consistency; few to frequent stones; pH — 7.2.

C — Loam till; pale brown (10 YR 6/3); mottled; medium nuciform structure; hard consistency; stony; calcareous; pH — 7.8.

Because of its topographic position the natural drainage of the Parkhill loam is poor. This condition is often intensified by seepage from the surrounding higher land. The natural vegetation consists mainly of white cedar, elm, soft maple, hemlock and willow.

**Agriculture**

A large proportion of the Parkhill remains in woodland. Areas not in woodland are often used for pasture. When cultivated it is a late soil in the spring and at best is only fairly well suited to the production of cereal grains. Poor drainage makes it unsuited for the production of legumes. Timothy, hay and permanent pasture do fairly well and fair yields of buckwheat are obtained. Where the soil is cultivated, applications of phosphatic fertilizer are required to maintain fertility levels.

***Parkhill loam, supporting poor pasture such as this, should be cultivated and planted to a good permanent pasture mixture.***

### Parkhill Silt Loam (2,600 acres)

This type occurs in small, widely scattered areas throughout the County and is similar to the Parkhill loam except for surface texture. Improved drainage conditions are usually required before the soil is capable of growing a wide range of crops.

## C. SOILS FORMED FROM HEAVY TEXTURED LIMESTONE AND SHALE TILL

A fairly broad expanse of heavy textured soils occurs in southwestern Bruce County. The materials consist of limestone and shale till intermixed with lacustrine materials. The presence of the till materials allows for fairly free movement of water through the profile and has facilitated internal drainage. The soils are well supplied with lime, free carbonates occurring in the underlying till.

Five series were mapped in this group, the Huron, Vincent, Perth, Kemble and Brookston. The Huron series is the well drained member of the Huron catena and the Perth series is the imperfectly drained member. The Vincent series and the Kemble series are the well drained and imperfectly drained members, respectively, of the Vincent catena. The Brookston series is the poorly drained member of both the Huron and Vincent catenas.

### (i) *Good Drainage*

### Huron Clay Loam (9,600 acres)

Found in the southwestern townships of Bruce County, Huron clay loam occurs on smooth moderately sloping topography and is formed from till deposits intermixed with lacustrine materials. It is a Grey-Brown Podzolic soil with a profile exhibiting the following characteristics:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–4 inches clay loam; very dark brown (10 YR 2/2); fine granular structure; friable consistency; occasional stones; pH — 6.7.

$A_{21}$— 4–9 inches clay loam; light yellowish brown (10 YR 6/4); weak platy structure; friable consistency; stonefree; pH — 6.5.

$A_{22}$— 9–11 inches clay loam; very pale brown (10 YR 7/4); weak platy structure; friable consistency; stonefree; pH — 6.4.

$B_2$ — 11–25 inches clay; dark brown (10 YR 4/3); coarse blocky structure; very hard consistency; when dry, plastic when wet; few stones; pH — 7.0.

C — Clay till; pale brown (10 YR 6/3); fragmental structure; hard consistency when dry; plastic when wet; few to frequent stones; calcareous; pH — 7.8.

***Huron clay loam belongs to the Grey-Brown Podzolic Great Soil Group. Note the well developed $A_2$ and B horizons.***

Huron soils are moderately susceptible to erosion and are particularly erodible where steep slopes along streams and rivers permit rapid run-off of water. Both external and internal drainage are good. Present forested areas consist chiefly of small wodlots where soft maple and elm are dominant. Ironwood, ash and basswood are also common. The soil is fairly well supplied with plant nutrients.

**Agriculture**

The Huron soils are well suited to general farming, beef raising and dairying, and some good farms have been established on this series. Most of the farm crops grown in Bruce County have been produced on these soils with reasonably good success. The types are well adapted to the growing of cereal grains, alfalfa, hay, and pasture.

Susceptibility to erosion is the chief hazard limiting the production of some crops. However, where dairy farming is practised, the use of forage crops and barnyard manure provides the basis for an effective and sound erosion control program. The internal drainage and the supply of plant nutrients are sufficiently good to permit the growth of alfalfa and other legumes. Potash and phosphate are the main requirements of legumes. Additions of phosphate,

potash and nitrogen are necessary to maintain fertility levels, and barnyard manure should be used to preserve a good physical condition in the soil.

### Huron Silt Loam (4,900 acres)

Formed on similar materials to the Huron clay loam, Huron silt loam differs from the clay loam only in the texture of the surface horizons. Land use and soil management practices are the same as those used for the Huron clay loam.

### Vincent Clay Loam (900 acres)

Small areas of Vincent clay loam occur in Amabel and Albemarle Townships. Formed on calcareous, fine textured till the Vincent soils exhibit the characteristics of the Brown Forest — Grey-Brown Podzolic Intergrades. A description of a typical Vincent clay loam profile follows:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–3 inches clay loam; very dark greyish brown (10 YR 3/2); medium granular structure; friable consistency; few to frequent stones; pH — 7.2.

$B_1$ — 3–10 inches clay loam; yellowish brown (10 YR 5/4); fine to medium nuciform structure; firm consistency; few stones; pH — 7.3.

$B_2$ — 10–21 inches clay loam; brown (7.5 YR 4/4); medium nuciform structure; hard consistency when dry, plastic when wet; frequent stones; pH — 7.4.

C — Clay loam till; light brown (7.5 YR 6/4); fragmental structure; hard consistency when dry, plastic when wet; few stones; few shale fragments; pH — 8.0.

The development of a weak $A_2$ horizon may occur which is pale brown in colour and has a weak platy structure. It does not occur as a continuous layer which can be observed in all profiles but more frequently is found in small pockets. When this layer is present the profile resembles the Grey-Brown Podzolic soils more closely than the Brown Forest soils.

The topography is smooth moderately rolling and the series is moderately susceptible to erosion. The slope of the land is conducive to good external drainage. Although the materials are not as porous as the loam tills, there are sufficient stones present to allow fair internal drainage. Beech and hard maple are the dominant tree species occurring in the woodlots with ash, basswood and ironwood also present. In some areas a secondary growth of poplar and silver birch occurs.

#### Agriculture

The Vincent soils are used chiefly for general farming. The variety of crops grown is conditioned by climate but good yields of crops, commonly grown in the district where these soils occur, are obtained.

The use of the Vincent soils is hindered by the amount of stones on the surface. In some areas rock outcrops occur which interfere with cultivation and complicate the sowing and harvesting of crops. Soil loss, due to erosion, can be reduced through the use of long rotations and cover crops.

The soils are well supplied with lime but require additions of phosphatic potassic and nitrogenous fertilizers to maintain fertility.

**Vincent Silt Loam (600 acres)**

Used for the same purposes as Vincent clay loam, Vincent silt loam differs from the clay loam only in the texture of the surface horizons. Like the Vincent clay loam the use of Vincent silt loam is hindered by the presence of rock outcrops in some areas.

***(ii) Imperfect Drainage***

**Perth Clay Loam (53,300 acres)**

A large area of the southwestern townships is occupied by Perth clay loam. It has developed on calcareous fine textured till and has been previously mapped in other parts of Ontario. The type is a member of the Grey-Brown Podzolic Great Soil Group and exhibits the following characteristics:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–5 inches clay loam; very dark grey (7.5 YR 3/0); medium granular structure; friable consistency; stonefree; pH — 6.8.

$A_2$ — 5–13 inches clay loam; brown (7.5 YR 5/4); slightly mottled; medium nuciform structure; friable consistency; stonefree; pH — 6.5.

$B_2$ — 13–25 inches clay; dark greyish brown (10 YR 4/2); mottled; coarse blocky structure; hard consistency; stonefree; pH — 7.0.

C — Clay till; brown (10 YR 5/3); massive structure; hard consistency; calcareous; few stones; pH — 7.8.

The topography is smooth gently sloping and both internal and external drainage are slow. The soil has not suffered greatly from sheet erosion and chemical tests show it to be fairly well supplied with plant nutrients.

Although most of the land has been cleared, existing woodlots show the tree cover to be dominantly soft maple and elm. Ash, ironwood, basswood and beech are also common.

**Agriculture**

Perth clay loam is used chiefly for general farming and beef raising in Bruce County. Fairly good yields of cereal grains, hay and pasture can be obtained although crop production is limited, to some extent, by inadequate drainage. During dry seasons Perth soils produce good yields because of their fairly high moisture reserve.

The soil is fairly well supplied with plant nutrients and the organic matter supply can be maintained by applications of barnyard manure. Maintenance of good tilth is necessary for the successful management of Perth soils.

### Perth Silt Loam (14,600 acres)

Perth silt loam occurs mainly in the region of Kincardine and is used chiefly for general farming and beef raising. Most of the type is cleared and devoted to the growth of the same crops as those grown on the Perth clay loam.

### Kemble Clay Loam (1,500 acres)

One of the less extensive soil types in Bruce County, Kemble clay loam occurs in the northern part of the County, and is the imperfectly drained member of the Vincent series. Kemble clay loam is a Brown Forest — Grey-Brown Podzolic intergrade and the profile exhibits the following characteristics:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–5 inches clay loam; very dark greyish brown (10 YR 3/2); medium granular structure; friable consistency; few stones; pH — 7.2.

$B_2$ — 5–12 inches clay loam; brown (7.5 YR 4/4); mottled; medium nuciform structure; hard consistency when dry, plastic when wet; frequent stones; pH — 7.4.

C — Clay loam till; light brown (7.5 YR 6/4); fragmental structure; hard consistency when dry, plastic when wet; few to frequent stones; pH — 7.8.

A thin, pale brown $A_2$ horizon may occur in some locations accompanied by a finer textured B horizon. In such areas the profile resembles that of the Grey-Brown Podzolic soils. In some districts rock outcrops occur.

The topography is smooth gently sloping and erosion is slight. The internal and the external drainage are slow. The natural tree vegetation occurring in the existing woodlots is dominantly soft maple and elm. Where these trees have been removed and the area has then been allowed to go back to trees, a secondary growth of poplar, silver birch and sumac occurs. The type is fairly well supplied with plant nutrients, the chief limitations to crop production being the presence of rock outcrops and imperfect drainage.

#### Agriculture

The Kemble soils are used chiefly for general farming, and they occur in a part of the County where cool climate hinders the growth of some crops. However, good to fair yields of oats, red clover, corn, hay and pasture have been reported on these soils.

In some areas the presence of outcroppings of the bedrock are a handicap to cultivation. Drainage improvement would likely permit the growth of a

wider range of crops but installation of drains would be difficult in areas where rock outcrops occur.

A balanced soil fertility program will include the use of barnyard manure and phosphatic and nitrogenous fertilizers.

**Kemble Silt Loam (600 acres)**

Small areas of Kemble silt loam are present in the Bruce Peninsula. The type is similar to the Kemble clay loam supporting the same kind of farm endeavour.

***(iii) Poor Drainage***

**Brookston Clay Loam (60,200 acres)**

Developed on clay till intermixed with lacustrine material, Brookston clay loam is the poorly drained member of both the Huron and Vincent catenas. It is a Dark Grey Gleisolic soil. As a result of poor drainage the profile is weakly developed and the horizons are not well defined. A typical Brookston clay loam profile found in woodlots is described below:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–7 inches clay loam; black (10 YR 2/1); fine granular structure; friable consistency; occasional stones; pH — 7.2.

G — 7–24 inches clay; grey-brown (10 YR 5/2); strongly mottled; massive structure; hard consistency when dry, plastic when wet; pH — 7.2.

C — Clay till; pale brown (10 YR 6/3); massive structure; very hard consistency when dry, very plastic when wet; mottled strongly; few to frequent stones; pH — 7.6.

The topography is smooth very gently sloping and both the external and internal drainage are poor. Tree cover consists mainly of elm, ash and cedar. The natural fertility level of Brookston soils is high but deteriorates rapidly under conditions of excessive cropping.

**Agriculture**

The Brookston soils in Bruce County are used chiefly for general farming. They are well adapted to oats, timothy, alsike, hay and pasture. Cash crops, such as peas, beans and flax do well, particularly when the soil is drained. The Brookston soils are adapted to a much wider range of crops when drained. Pastures on this soil are fairly good, although some are badly infested with wild carrot.

The rotation on this type usually consists of grain, hay and pasture or grain, corn and hay. Peas, beans or flax may take the place of corn on some farms. Fertilizers used include 2–16–6 on corn and 4–12–10 on grain. Additions of barnyard manure are required to maintain a good physical condition in the soil.

**Brookston Silt Loam (2,000 acres)**

This soil type is associated with the Brookston clay loam. The profile is similar to that of the clay loam, but the surface soil is lighter in texture. All areas in crop yield about the same as the clay loam.

## D. SOILS FORMED FROM FINE TEXTURED SHALE AND LIMESTONE TILL

The eastern side of the Bruce Peninsula, particularly in the neighbourhood of Cape Croker, consists partly of soils developed on clay till derived from shale and limestone materials. The materials consist of limestone intermixed with a large amount of shale and are derived from the bedrock of the Queenston formation. Although there is a much larger amount of shale present in this till than there is in the till from which the Huron catena developed, there is sufficient limestone to make the till calcareous.

The Dunedin catena is mapped where these materials occur. It consists of the well drained Dunedin series, the imperfectly drained Craigleith series, and the poorly drained Morley series.

### (*i*) *Good Drainage*

**Dunedin Clay Loam (2,700 acres)**

Dunedin clay loam is a well drained soil with smooth moderately sloping topography. Since both Brown Forest and Grey-Brown Podzolic characteristics appear in the soil profiles the type is considered to be a Brown Forest — Grey-Brown Podzolic Intergrade. A description of Dunedin clay loam developed under tree cover follows:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–3 inches clay loam; very dark greyish brown (2.5 Y 3/2); fine granular structure; friable consistency; very stony; pH — 6.5.

$B_1$ — 3–9 inches clay loam; grey-brown (10 YR 5/2); coarse nuciform structure; hard consistency when dry, plastic when wet; occasional stones; pH — 6.5.

$B_2$ — 9–15 inches clay; reddish brown (5 YR 4/3); coarse blocky structure; very hard consistency when dry, very plastic when wet; few stones; pH — 7.0.

C — Clay till; dark reddish brown (5 YR 3/4); medium nuciform structure; very hard consistency when dry, very plastic when wet; very stony; pH — 7.8.

Most of the type is covered with forest, the dominant tree species being soft maple, elm, ash and ironwood. Moderate slopes and rapid run-off make the soil susceptible to erosion. The type is fairly well supplied with plant nutrients, but is generally somewhat more acid than the Huron clay loam.

**Agriculture**

Dunedin clay loam is located in a part of the County where little of the land has been cleared and is at present supporting tree growth. Clearing of the land would yield a soil that should produce a wide range of crops. However, certain requirements are necessary before the soil could be satisfactorily farmed.

The use of the Dunedin clay loam is conditioned by the number of stones on the surface. When the cover is removed the soil is highly erodible and care must be taken that farm management is such that soil loss is kept to a minimum. The type also requires additions of large amounts of barnyard manure to keep it in good physical condition.

***(ii) Imperfect Drainage***

**Craigleith Clay Loam (800 acres)**

Craigleith clay loam is developed from the same materials as the Dunedin clay loam, and is the imperfectly drained member of the Dunedin catena. It is one of the Brown Forest — Grey-Brown Podzolic Intergrade soils and is described below:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–4 inches clay loam; very dark greyish brown; (2.5 Y 3/2); fine nuciform structure; friable consistency; moderately stony; pH — 6.5.

$B_2$ — 4–16 inches clay; reddish brown (5 YR 4/3); mottled; coarse nuciform structure; very hard consistency when dry, very plastic when wet; few stones; pH — 6.8.

C — Clay till; dark reddish brown (5 YR 3/4); nuciform structure; very hard consistency when dry, plastic when wet; very stony; pH — 7.8.

The topography is smooth gently sloping and erosion is slight. The external drainage of the Craigleith clay loam is moderate to low, while the internal drainage is slow. The surface is not so stony as that of the Dunedin clay loam. Present forested areas consist mainly of soft maple and elm.

**Agriculture**

As Craigleith clay loam occurs in a part of the County that is not agriculturally developed, most of the type is not cultivated. Such areas are used mostly for the growth of native grasses but could produce fair yields of oats, hay and corn. Use of the land, in some areas, may be conditioned by the number of surface stones.

***(iii) Poor Drainage***

**Morley Clay Loam (400 acres)**

Morley clay loam is another of the minor soil types occurring in Bruce County. It is the poorly drained member of the Dunedin catena and is a Dark Grey Gleisolic soil. A description of a typical profile of Morley clay loam follows:

$A_2$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–6 inches clay loam; dark grey (7.5 YR 4/0); fine nuciform structure; friable consistency; few stones; pH — 6.7.

G — 6–15 inches clay; dark brown (7.5 YR 4/2); strongly mottled; coarse blocky to prismatic structure; very hard consistency when dry, very plastic when wet; few stones; pH — 7.5.

C — Clay till; dark reddish brown (5 YR 3/4); medium nuciform structure; hard consistency when dry, plastic when wet; frequent stones; pH — 7.8.

The topography is smooth very gently sloping and both internal and external drainage are poor. The natural vegetation consists mainly of elm, ash and cedar.

**Agriculture**

Most of the type is cleared and is used for pasture and hay crops. A wider range of crops could be grown if drainage were improved.

The natural fertility of the Morley soils is usually high, and additions of fertilizer should be necessary only to maintain fertility where the land is cropped. Maintenance of organic matter is of prime importance when a crop rotation is used so that the soil will be kept in good physical condition.

## E. SOILS FORMED FROM GLACIO-FLUVIAL MATERIALS

Glacio-fluvial materials are those deposited by both ice and water. The materials may be dominantly sand or dominantly gravel with pockets of till also occurring. The Waterloo series is developed on materials which are dominantly sand with inclusions of small amounts of gravel and till. The Donnybrook series is developed on materials dominantly of gravel in nature with small amounts of sand and till also present.

### I. Sandy Materials

#### (i) *Good Drainage*

**Waterloo Sandy Loam (31,600 acres)**

Associated with kame formations the Waterloo series consists largely of sandy materials and is the well drained member of the Waterloo catena. It is the only catenary member mapped in Bruce County. The profile, as described below, is characteristic of the Grey-Brown Podzolic soils:

$A_0$ — Thin layer of partially decomposed twigs, leaves, etc.

$A_1$ — 0–4 inches sandy loam; very dark greyish brown; (10 YR 3/2); fine crumb structure; friable consistency; occasional stones; pH — 6.5.

$A_{21}$ — 4–14 inches sandy loam; light yellowish brown (10 YR 6/4); fine platy structure; very friable consistency; occasional stones; pH — 6.3.

$A_{22}$ — 14–17 inches sandy loam; very pale brown (10 YR 7/3); weak platy structure; very friable consistency; stonefree; pH — 6.3.

$B_2$ — 17–23 inches loam; brown (10 YR 5/3); fine nuciform structure; firm consistency; few stones; pH — 7.0.

C — Sand; grey (10 YR 7/2); single grain structure; loose consistency; few stones; pH — 7.8.

The series is well drained, having a high external and a rapid internal drainage. It is very susceptible to sheet erosion because of the irregular steeply sloping topography. Wind erosion usually occurs when the soil is left without vegetative cover. Tree cover in the woodlots consists mainly of hard maple and beech with elm, ash, ironwood, and basswood also occurring.

**Agriculture**

The Waterloo sandy loam is a soil which, because of the porous nature of the materials, can be cultivated with ease early in the spring. It is used for general farming and is adapted to alfalfa, red clover, timothy and oats.

Crop production is limited by low fertility and susceptibility to erosion. Some cash crops, such as potatoes, do well when the soil is heavily fertilized but row crops should not be grown intensively because of the danger of excessive loss of valuable topsoil. The soil should be kept under cover for as long a time as possible. It is suggested that this soil be used chiefly for pasture and hay crops which can be used for animal production. The manure of the animals can be applied to the soil, in addition to other fertilizers, in order to build a satisfactory level of soil fertility. The soil is low in nitrogen, phosphorus and potash and requires additions of these elements for adequate plant nutrition.

**II. Gravelly Materials**

**Donnybrook Sandy Loam (29,400 acres)**

Associated with kame and esker formations Donnybrook sandy loam consists largely of gravel materials which contain pockets of sand or till. The type occurs in large tracts in the part of the County west of the village of Teeswater and is a Grey-Brown Podzolic soil. The following is a description of Donnybrook sandy loam developed under tree vegetation:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–4 inches sandy loam; dark grey-brown (10 YR 4/2); fine crumb structure; very friable consistency; few to frequent stones; pH — 7.0.

$A_{21}$— 4–13 inches sand; yellowish brown (10 YR 5/6); weak platy structure; very friable consistency; gravelly; pH — 6.8.

$A_{22}$— 13–17 inches sand; pale brown (10 YR 6/3); single grain structure; loose consistency; gravelly; pH — 6.4.

$B_2$ — 17–23 inches sandy loam; dark brown (10 YR 4/3); weak nuciform structure; friable consistency; gravelly; very stony; pH — 7.2.

C — Sand and gravel; very pale brown (10 YR 7/3); single grain structure; loose consistency; calcareous; very stony; pH — 7.8.

The horizons are usually poorly defined in the esker formations, possibly due to the porous nature of the materials. The soil is well drained and has irregular steeply sloping topography. Vegetation in the remaining woodlots consists mainly of beech and hard maple.

**Agriculture**

Donnybrook sandy loam is used chiefly for general farming in Bruce County. Fair yields of oats, alfalfa, hay and pasture are obtained and can be increased with the use of fertilizer. The type has a low natural fertility and fertilizers high in nitrogen, phosphorus and potassium are needed to increase the fertility level.

Cultivation is hampered by the complex topography and by the presence of boulders in the upper part of the profile. However, in some areas, where a foot or two of sandy loam occurs over the stony materials the land may be worked with greater ease. The type is very susceptible to erosion and should be kept under cover for as long as possible. Steep slopes should have a permanent cover of grass or trees, but rotation crops can be grown on the more gradual slopes.

Most of the cleared uncultivated areas are used for pasture which, when well managed, provides a good growth of grass. However, undergrazing has resulted in the growth of buckthorn which soon reduces the value of the pasture.

## F. SOILS FORMED FROM OUTWASH MATERIALS

The outwash materials are sands or gravels deposited by moving water. The size of the particles deposited depends upon the speed at which the water moves — the slower the movement of water the smaller the particles deposited. These materials assume the form of sand bars, beaches and outwash plains.

The Fox, Tioga and Sullivan catenas are developed on well sorted sandy outwash materials. The Fox catena is made up of the excessively drained

Plainfield series, the well drained Fox series, the imperfectly drained Brady series and the poorly drained Granby series. The Tioga catena consists of the well drained Tioga series and the poorly drained Granby series.

The Sullivan series is the well drained member of the Sullivan catena, the Brady series is the imperfectly drained member, and the Granby series is the poorly drained member.

The Teeswater, Sargent and Burford catenas are formed on well sorted gravelly outwash. The Teeswater, Sargent and Burford series are the well drained members of the respective catenas while the Brisbane series is the imperfectly drained member of the Burford catena. The imperfectly drained member of the Teeswater and Sargent catenas was not mapped in Bruce County. The poorly drained members of all three catenas were mapped as the Gilford series.

## I. Sandy Materials

### (*i*) *Excessive Drainage*

#### Plainfield Sand (15,200 acres)

Plainfield sand is found near the Lake Huron shore in Amabel and Albemarle Townships. Developed on grey sandy materials the type is a member of the Great Soil Group known as the Dry Sands. A virgin profile of a typical Plainfield sand is described below:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–3 inches sand; dark grey (10 YR 4/1); single grain structure; loose consistency; stonefree; pH — 6.3.

$A_2$ — 3–37 inches sand; light yellowish brown (10 YR 6/4); chroma decreases in intensity with depth; single grain structure; loose consistency; pH — 6.6.

C — Sand; grey (10 YR 7/2); single grain structure; loose consistency; calcareous; pH — 7.6.

Usually the Plainfield sand is stabilized and exhibits a weakly developed colour profile. Occasionally a colour B horizon occurs. Where the Plainfield is mapped in association with the Eastport series wind blown calcareous sand may be found on the surface.

The topography is usually smooth gently sloping with dune-like topography occurring where the type is mapped along lake shores. Excessive drainage occurs because of the porosity of the materials. Internal drainage is very rapid and surface run-off is low. The tree cover consists mainly of a second growth of poplar, silver birch, spruce and cedar.

#### Agriculture

Because of excessive drainage, high susceptibility to wind erosion and low nutrient level, little of the Plainfield series has been cleared for cultivation. Coarseness of material and danger of wind erosion make it difficult to stabilize

*The vegetative cover on this Plainfield sand was not sufficiently dense to hold the soil in place. Reforestation is recommended for areas such as this.*

the soil unless a permanent cover of trees or specially adapted pasture grasses are grown.

The soil is probably best used for recreational purposes and tree growth.

**(ii) *Good Drainage***

**Fox Sandy Loam (20,700 acres)**

Occurring on smooth gently sloping topography, Fox sandy loam is a well drained soil exhibiting the characteristics of the Grey-Brown Podzolic Great Soil Group. The Fox has a distinct textural B horizon which is illustrated in the following profile description:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–4 inches sandy loam; very dark greyish brown (10 YR 3/2); fine crumb structure; friable consistency; stonefree; pH — 6.5.

$A_{21}$— 4–24 inches sand; yellowish brown (10 YR 5/4); single grain structure; loose consistency; stonefree; pH — 6.3.

$A_{22}$— 24–26 inches sand; light yellowish brown (10 YR 6/4); single grain structure; loose consistency; stonefree; pH — 6.2.

$B_2$ — 26–30 inches loam; dark brown (10 YR 4/3); fine nuciform structure; friable consistency; stonefree; pH — 6.7.

C — Sand; light grey (10 YR 7/2); single grain structure; loose consistency; stonefree; pH — 7.8.

The sugar maple-beech is the dominant association found in the woodlots on the Fox series. The type is low in organic matter, potash and phosphate and is moderately susceptible to wind erosion, particularly when left without cover for periods of time.

**Agriculture**

The Fox series can be used extensively for the production of specialized crops, being well suited to the production of tobacco, tree fruits, vegetables and small fruits. The porous soil materials allow for rapid percolation of moisture permitting early spring cultivation. Its good drainage, workability, light texture and uniformity make it especially suited to early crops. However, in Bruce County the climate is sometimes a limiting factor and certain specialized crops cannot be successfully grown because of the danger of frost. The Fox sandy loam usually supports general farming in the County and crops such as oats, alfalfa, hay and pasture are grown.

Crop production is limited by low fertility, susceptibility to erosion, and droughtiness. Nitrogen, phosphate and potash levels should be increased and maintained by additions of mineral fertilizer. Cover crops and manure should be used to build up and maintain the organic matter content and to help prevent soil loss due to wind erosion. Where high value crops are grown on Fox soils, heavy applications of fertilizer are profitable and desirable.

**Tioga Sandy Loam (7,100 acres)**

The Tioga sandy loam occurs in the region of the village of Hepworth and is the well drained member of the Tioga catena. Since the Podzol profile occurs in the A horizon of the Grey-Brown Podzolic profile, the Tioga is considered as a Podzol — Grey-Brown Podzolic soil. A description of a typical Tioga sandy loam profile follows:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–2 inches sandy loam; dark grey (10 YR 4/1); fine crumb structure; very friable consistency; pH — 6.0.

$A_{2p}$— 2–5 inches sand; light grey (10 YR 7/2); single grain structure; loose consistency; stonefree; pH — 5.9.

$B_{2p}$— 5–12 inches sand; dark yellowish brown (10 YR 4/4); single grain structure; loose consistency; stonefree; pH — 6.4.

$B_{3p}$— 12–20 inches sand; yellowish brown (10 YR 5/6); single grain structure; loose consistency; stonefree; pH — 6.4.

$A_2$ — 20–30 inches sand; light yellowish brown (10 YR 6/4); single grain structure; loose consistency; non-calcareous; pH — 6.5.

$B_2$ — 30–34 inches sandy loam; brown (10 YR 5/3); weak crumb structure; loose consistency; stonefree; pH — 6.8.

C — Sand; grey (10 YR 6/1); single grain structure; loose consistency; calcareous; pH — 7.6.

The characteristic A horizons of the Podzol soil are not in evidence in areas where the land has been disturbed by cultivation.

The Tioga occurs as a smooth very gently sloping outwash plain with low external drainage and rapid internal drainage. Tree cover consists mainly of sugar maple and beech, although in many sections where these trees have been removed, a secondary growth of poplar, silver birch, balsam and cedar is common. The natural fertility of the series is low and the surface reaction is usually medium acid.

**Agriculture**

General farming and the growing of some specialized crops is practised on the Tioga series. Because of low fertility and susceptibility to erosion large acreages have been reforested. However, where the land is cleared fairly extensive areas are used for pasture purposes.

When heavy applications of fertilizer are applied good potato crops can be grown. Where the soil is cultivated, additions of barnyard manure are needed to reduce the loss of soil by wind erosion and increase and maintain the organic matter content of the soil. Fertilizers high in nitrogen, phosphorus and potassium should be used for satisfactory growth of most farm crops.

### Tioga Sand (100 acres)

Tioga sand is one of the minor soil types occurring in the County and is similar to the sandy loam. It is somewhat more susceptible to erosion and has a lower natural fertility than the sandy loam. The type is probably best used for forestry.

### Sullivan Sandy Loam (2,600 acres)

Sullivan sandy loam is developed on calcareous sandy outwash materials and is found chiefly in the vicinity of the town of Hanover. It exhibits both Brown Forest and Grey-Brown Podzolic characteristics and is considered to be a Brown Forest — Grey-Brown Podzolic Intergrade. The following is a description of a profile developed under deciduous vegetation:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–3 inches sandy loam; dark grey (2.5 YR 4/0); fine crumb structure; very friable consistency; stonefree; pH — 7.2.

$B_2$ — 3–10 inches sand; dark brown (10 YR 4/3); single grain structure; loose consistency; stonefree; pH — 7.4.

C — Sand; grey (10 YR 6/1); single grain structure; loose consistency; calcareous; pH — 8.0.

Although the series is essentially stonefree, occasional gravel strata occur in some areas. The topography is smooth gently sloping and the drainage is good. The natural vegetation present in existing woodlots consists mainly of

hard maple and beech. The series has a low level of natural fertility, being low to very low in phosphorus and organic matter and low in potassium.

**Agriculture**

A large part of the type is cleared and is used for general farming and dairying. Much of the land is in pasture, while crops of wheat, oats and hay are found on the cultivated areas. Tree fruits are adapted to the series, especially where the climate permits. The type usually occurs in a part of the County where the climate is too rigorous for the growing of tender fruits.

Sullivan sandy loam is only fairly well suited to the production of most farm crops because of low fertility and susceptibility to wind erosion. Chemical tests indicate that the type is low in practically all plant nutrients and the organic matter content is low. Fertilizers high in nitrogen, phosphorus and potassium should be used if adequate yields of most farm crops are to be obtained. The soil should be protected from wind erosion by long rotations and cover crops. Loss of soil by erosion is particularly dangerous on soils of this type with such a shallow solum.

The open nature of the materials makes retention of soil moisture difficult, and the type is usually droughty.

**Sullivan Sand (1,900 acres)**

Where the surface texture is sand rather than sandy loam, Sullivan sand is mapped. Low fertility and susceptibility to erosion make these soils only fairly well suited to the production of the crops commonly grown in the district.

***(iii) Imperfect Drainage***

**Brady Sandy Loam (17,400 acres)**

Formed on materials similar to those of the Fox and Sullivan series, Brady sandy loam is the imperfectly drained member of the Fox and Sullivan catenas and exhibits the characteristics of the Grey-Brown Podzolic Great Soil Group. A profile description of a typical Brady sandy loam developed under forest cover follows:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–5 inches sandy loam; very dark brown (10 YR 2/2); fine crumb structure; friable consistency; stonefree; pH — 6.8.

$A_2$ — 5–13 inches sand; yellowish brown (10 YR 5/4); mottled; single grain structure; loose consistency; stonefree; pH — 6.5.

$B_2$ — 13–23 inches sandy loam; dark brown (10 YR 4/3); mottled; fine nuciform structure; friable consistency; stonefree; pH — 7.0.

C — Sand; light grey (10 YR 7/2); single grain structure; loose consistency; stonefree; calcareous; pH — 7.8.

Brady sandy loam is a smooth very gently sloping soil and is imperfectly drained. The external drainage is very low and internal drainage is moderate. Internal drainage may be retarded in some areas by the presence of impermeable clay or rock layers at depths of five feet and more. Tree cover consists chiefly of soft maple and elm with some cedar occurring, particularly in the northern part of the County.

**Agriculture**

Small areas of Brady sandy loam occur in the southern part of the County and fair crops of oats, hay, red clover and pasture are grown. The largest acreage of the type occurs in the Port Elgin district where it is used to produce tobacco. Tobacco and vegetable crops can be grown in this northerly area because of the moderating influence of Lake Huron on the climate. However, early and late frosts often interfere with the planting and harvesting of these crops and, at times, serious crop losses occur due to frost.

The type is low in nearly all plant nutrients and nitrogenous, phosphatic and potassic fertilizers are required for adequate plant growth. Additions of large amounts of fertilizer and manure are most necessary when cash crops are grown.

**(iv) *Poor Drainage***

**Granby Sandy Loam (9,100 acres)**

The Granby series occurs in level to depressional areas and is the poorly drained member of the Fox, Tioga and Sullivan series. A Dark Grey Gleisolic type of profile has developed in which it is difficult to observe definite horizon differentiation. Occupying only a small part of the total County acreage it is largely found in the Townships of Brant and Amabel. The original tree cover under which this type developed consisted of elm, ash and cedar with some soft maple, balsam and spruce. A profile of Granby sandy loam developed under natural forest cover follows:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–7 inches sandy loam; very dark brown (10 YR 2/2); fine crumb structure; friable consistency; stonefree; pH — 6.8.

G — 7–25 inches sand; light brownish grey (10 YR 6/2); mottled; single grain structure; loose consistency; stonefree; pH — 7.1.

C — Sand; light grey (10 YR 7/2); single grain structure; loose consistency; stonefree; calcareous; pH — 7.8.

Smooth very gently sloping to depressional topography and poor drainage are important characteristics of this type. The profile is stonefree and the surface soil is usually fairly high in organic matter and exhibits a dark colour.

**Agriculture**

A large part of the Granby sandy loam remains in pasture or woodland. Poor drainage results in late spring cultivation so that it is often too late to

plant any cereal grains except buckwheat. Areas in pasture support only fair stands of grasses, usually consisting of Redtop and Canada Blue. Scrub tree growth is establishing itself on areas that have reverted to pasture, thus lessening their usefulness for the production of forage.

When drainage improvement is effected, fair crops of cereal grains, hay and pasture are produced. When the soil is cultivated the organic matter should be maintained to assure adequate moisture conservation. Once the required drainage is effected, fertility must be maintained because the reserve supply of nutrients is not high.

**II. Gravelly Materials**

***(a) Pale Brown in Colour***

***(i) Good Drainage***

**Teeswater Silt Loam (17,100 acres)**

Developed from silty alluvial deposits over pale brown, gravelly outwash materials, Teeswater silt loam occurs for the most part along stream courses, particularly along the Teeswater and Saugeen Rivers. Smooth gentle slopes and good drainage are characteristic of the type. It is a Grey-Brown Podzolic soil as indicated by the following profile description:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–4 inches silt loam; dark greyish brown (10 YR 4/2); fine granular structure; friable consistency; occasional stones; pH — 6.5.

$A_{21}$— 4–16 inches silt loam; light yellow-brown (10 YR 6/4); fine platy structure; friable consistency; stonefree; pH — 6.0.

$A_{22}$— 16–19 inches silt loam; pale brown (10 YR 6/3); weak platy structure; friable consistency; stonefree; pH — 5.7.

$B_2$ — 19–31 inches clay loam; dark brown (10 YR 4/3); medium nuciform structure; hard consistency when dry, plastic when wet; moderately stony; pH — 7.0.

C — Sand and gravel; very pale brown (10 YR 7/3); single grain structure; loose consistency; calcareous; pH — 7.8.

Most of the Teeswater silt loam has been cleared and is now under cultivation. The tree cover appears to have been dominated by hard maple and beech with ironwood, basswood and soft maple present in smaller numbers. The external drainage is low but the underlying porous materials permit rapid internal drainage. The soil has not suffered noticeably from sheet erosion but gully erosion may require control measures, particularly along the stream courses. The type is fairly uniform, varying chiefly in the depth of the silty overburden.

**Agriculture**

General farming and dairying are the main endeavours practised on the Teeswater silt loam. The type is well suited for the growing of nearly all crops commonly grown in the County and good yields are obtained from fall wheat, oats, barley, alfalfa, corn, turnips, tree fruits, hay and pasture. The soil is also adapted to certain cash crops such as raspberries, strawberries, corn, peas, beans and tomatoes.

Fertility and organic matter maintenance are the main requisites for successful crop production. The soil has a medium content of potassium and organic matter but is low in phosphorus. Fertilizer additions will benefit most crops, particularly the cash crops where high yields are required. Additions of appropriate amounts of organic matter are ensured when the farm livestock population is kept at an adequate level.

The rapid internal drainage permits early spring cultivation. Occasionally stones and cobbles occur on the surface and to some extent interfere with cultivation. This condition only happens when the stonefree silty overburden has been eroded.

**Sargent Loam (5,300 acres)**

Sargent loam is developed on well sorted gravelly materials and is a Brown Forest — Grey-Brown Podzolic soil. The type is characterized by its shallow profile and the high lime content of the parent material. The profile described below is typical of the Sargent loam situated in a cut-over forested area where hard maple and beech form the tree cover:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–3 inches loam; very dark brown (10 YR 2/2); fine granular structure; friable consistency; gravelly; pH — 7.2.

$B_1$ — 3–6 inches loam; yellow-brown (10 YR 5/4); coarse granular structure; friable consistency; gravelly; calcareous; pH — 7.4.

$B_2$ — 6–11 inches clay loam; dark brown (10 YR 4/3); fine nuciform structure; friable consistency; gravelly; calcareous; pH — 7.5.

C — Sand and gravel; brown (10 YR 5/3); single grain structure; loose consistency; many stones; calcareous; pH — 8.0.

Profiles exhibiting Grey-Brown Podzolic characteristics have a loam textured $A_2$ horizon which has a weak platy structure and is pale brown in colour. The B horizon, of these profiles, is usually of slightly heavier texture and is somewhat better defined than that of the Brown Forest soil. Sargent loam is well drained with rapid internal drainage and medium external drainage. The topography is generally smooth gently sloping but in a few areas, particularly on the Bruce Peninsula, some steeper slopes occur.

**Agriculture**

Sargent loam is used chiefly for general farming since it occurs in a part of the County where the cool climate prevents the growth of certain cash crops for which it is well adapted. The type is fairly well suited to the growing of oats, wheat, alfalfa, hay and pasture. The production of agricultural crops is limited by low fertility levels. However, the use of fertilizers high in nitrogen, phosphorus and potassium will help to increase crop yields.

The Sargent soils are shallow and care should be taken to prevent loss of valuable surface soil in areas where erosion might occur.

***(b) Grey in Colour***

***(i) Good Drainage***

**Burford Loam (10,500 acres)**

The Burford series is developed on well sorted gravelly materials derived largely from limestone containing smaller proportions of siliceous and argillaceous materials. The Burford is the well drained member of the catena bearing the same name, and exhibits the characteristics of the Grey-Brown Podzolic soils. The following is a description of a Burford loam developed under a cover of deciduous trees consisting chiefly of hard maple and beech:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–4 inches loam; very dark greyish brown (10 YR 3/2); fine granular structure; friable consistency; few stones; pH — 6.5.

$A_{21}$— 4–17 inches loam; yellowish brown (10 YR 5/4); weak platy structure; friable consistency; few stones; pH — 6.3.

$A_{22}$—17–20 inches loam; light yellowish brown (10 YR 6/4); weak platy structure; very friable consistency; pH — 6.2.

$B_2$ — 20–33 inches clay loam; dark brown (10 YR 4/3); medium nuciform structure; hard consistency; gravelly; frequent stones; pH — 6.8.

C — Gravel and sand; light grey (10 YR 7/2); single grain structure; loose consistency; calcareous; pH — 7.8.

The Burford loam is a gravelly well drained soil that has developed on smooth gently sloping topography. Although most of the area mapped has been cleared, it would appear that the Burford loam developed under a tree cover of hard maple and beech. The surface soil when cultivated is a greyish brown loam, low in organic matter. The type is comparatively low in phosphorus and potassium.

**Agriculture**

Burford loam is well suited to hay and pasture crops and fairly well adapted to fall wheat, oats, barley, alfalfa and sweet clover. Potatoes and other vege-

***The B horizon of the Burford loam rests on the well sorted, gravelly, calcareous parent material.***

tables do well when the soil is heavily fertilized, and tree fruits are good when the climate is moderate.

The chief limiting factor to crop growth on Burford soils is low fertility. Additions of commercial fertilizers and manures are necessary in order to maintain an adequate fertility level. When such additions are made according to the requirements of the soil and of the crop to be grown, yields will be good.

In some areas cobblestones appear at or near the surface which may interfere with cultivation. Early spring cultivation is possible because of the porosity of the soil, which allows rapid percolation of water.

### (*ii*) *Imperfect Drainage*

#### Brisbane Loam (1,600 acres)

One of the lesser series found in the County, Brisbane loam is the imperfectly drained member of the Burford catena and is a Grey-Brown Podzolic soil. Smooth very gentle slopes and moderate to slow drainage are characteristic of the type. A description of a typical Brisbane loam profile follows:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–6 inches loam; very dark greyish brown (10 YR 3/2); fine granular structure; friable consistency; few stones; pH — 6.8.

$A_2$ — 6–10 inches loam; yellowish brown (10 YR 5/4); slightly mottled; weak platy structure; friable consistency; few stones; pH — 6.5.

$B_2$ — 10–22 inches clay loam; dark brown (10 YR 4/3); mottled; medium nuciform structure; hard consistency; gravelly; frequent stones; pH — 7.0.

C — Gravel and sand; light grey (10 YR 7/2); single grain structure; loose consistency; calcareous; pH — 7.8.

The internal drainage of the Brisbane loam is moderate and the external drainage is low. The natural vegetation in the remaining woodlots consists chiefly of soft maple and elm with ash, ironwood and balsam occurring in smaller amounts.

**Agriculture**

Crop production on the Brisbane loam is limited by imperfect drainage and low fertility. Under natural drainage conditions fair crops of oats, red clover, alsike, hay and pasture can be grown, but when drainage is improved the type is capable of growing the same crops that are grown on the Burford loam. Nitrogenous, phosphatic and potassic fertilizers should be added to the cultivated soil to increase fertility.

The type is used chiefly for general farming and occurs as small areas scattered throughout the County.

***(iii) Poor Drainage***

**Gilford Loam (900 acres)**

The Gilford series is the poorly drained member of the Burford, Teeswater and Sargent catenas and exhibits the characteristics of the Dark Grey Gleisolic Great Soil Group. Only a very small area of the type occurs in Bruce County. The following is a description of a Gilford loam profile:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–6 inches loam; very dark brown (10 YR 2/2); fine granular structure; friable consistency; few stones; pH — 7.0.

G — 6–19 inches loam; greyish brown (10 YR 5/2); mottled; medium blocky structure; friable consistency; stony; pH — 7.2.

C — Gravelly outwash; brown (10 YR 5/3); single grain structure; loose consistency; calcareous; pH — 7.6.

The topography is smooth very gently sloping and the drainage is poor. The natural vegetation consists mainly of elm, ash and cedar.

**Agriculture**

Gilford loam is used for pasture and woodlot. Poor drainage and low fertility limit crop production. However, when drainage is improved and fertility levels are maintained, fair yields of cereal grains, hay and pasture can be obtained.

The organic matter content is high but phosphorus and potassium levels are low. When cultivated, soil amendments are needed for adequate crop growth.

## G. SOILS DEVELOPED FROM SHALLOW SANDS OVER CLAY TILL OR CLAY

Soils developed on sands underlain by clay till or clay occupy about 3 per cent of Bruce County. The outwash materials are similar to those of the Fox catena while the clay till resembles that of the Huron catena. The clay materials resemble those of the Saugeen catena. The depth of sand is variable, ranging from a veneer of a few inches in depth up to three feet. Three series were mapped, the Bookton occurring on well drained sites, the Berrien on the imperfectly drained areas, and the Wauseon on the poorly drained locations. Where the sand deposit is a foot or more in depth a fair profile has developed which exhibits Grey-Brown Podzolic characteristics.

### (*i*) *Good Drainage*

#### Bookton Sandy Loam (400 acres)

Bookton sandy loam is a well drained soil with smooth gently sloping to moderately sloping topography. A wide range of profiles occurs depending on the depth of sand overburden. The profile exhibits the following characteristics:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–3 inches sandy loam; dark greyish brown (10 YR 4/2); fine crumb structure; very friable consistency; stonefree; pH — 6.6.

$A_2$ — 3–8 inches sand; yellowish brown (10 YR 5/6); single grain structure; loose consistency; stonefree; pH — 6.1.

$B_2$ — 8–16 inches sand; dark brown (10 YR 4/3); single grain structure; loose consistency; stonefree; pH — 6.8.

$B_3$ — 16–22 inches sand; brown (10 YR 5/3); single grain structure; loose consistency; stonefree; pH — 7.0.

C — Sand; greyish brown (10 YR 5/2); single grain structure; loose consistency; calcareous; pH—7.6.

D — Clay till or clay; brown (10 YR 5/3); prismatic structure; hard consistency; calcareous; pH —7.8.

There is a wide variation in the depth of sandy overburden. The heavy clay till or clay occurs at depths of 6 to 36 inches.

The natural vegetation found in the woodlots consists mainly of hard maple, beech and spruce.

**Agriculture**

Bookton sandy loam in Bruce County is used for dairying and general farming. The sandy veneer is low in phosphorus and potassium but the underlying clay till is better supplied with these elements. The type is fairly well suited to the production of cereal grains, hay and pasture. Vegetables, tree fruits and small fruits should do well where the climatic environment is satisfactory.

Fertility and organic matter maintenance are the main requirements for successful farming on this soil. Satisfactory nutrient and structural conditions can be maintained by soil management practices commonly associated with successful dairy farming operations.

***(ii) Imperfectly Drained***

**Berrien Sandy Loam (24,600 acres)**

Berrien sandy loam is the imperfectly drained member of the Bookton catena and exhibits the characteristics of the Grey-Brown Podzolic Great Soil Group. The topography is smooth gently sloping. The profile description is as follows:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–5 inches sandy loam; dark greyish brown (10 YR 4/2); fine crumb structure; very friable consistency; stonefree; pH — 6.8.

$A_2$ — 5–9 inches sand; pale brown (10 YR 6/3); mottled; single grain structure; loose consistency; stonefree; pH — 6.6.

$B_2$ — 9–19 inches sand; dark brown (10 YR 4/3); mottled; single grain structure; loose consistency; stonefree; pH — 7.2.

$B_3$ — 19–29 inches sand; yellowish brown (10 YR 5/6); single grain structure; loose consistency; stonefree; pH — 7.2.

C — 29–32 inches sand and gravel; greyish brown (10 YR 5/2); single grain structure; loose consistency; calcareous; pH — 7.6.

D — Clay till or clay; brown (10 YR 5/3); massive structure; hard consistency; calcareous; pH — 7.6.

The clay till or clay usually appears at depths of three feet and less. Although an arbitrary depth of 3 feet and less of sandy overburden has been established for the Berrien series, occasionally the sand deposits are more variable. In places the clay or clay till may come to the surface between sandy swells.

The natural drainage is imperfect, the run-off being low and the permeability slow. The natural vegetation consists mainly of soft maple, elm and ash. Coniferous species such as hemlock, cedar and spruce may also occur.

**Agriculture**

The Berrien sandy loam in Bruce County occurs chiefly along the Lake Huron shore and can be used for the production of tree fruits, small fruits and vegetables when drained. However, most of the type is used for general farming.

The chief limitations to successful crop production are low fertility and inadequate drainage. High fertility levels required for cash crops should be maintained by additions of mineral fertilizer and barnyard manure. General farm crops also require fertilizer additions if yields are to be maintained. Drainage by tiles may prove difficult because of the variation in depth of the sandy overburden.

***(iii) Poor Drainage***

**Wauseon Sandy Loam (7,200 acres)**

The Wauseon series occurs in smooth very gently sloping to depressional areas and is the poorly drained member of the Bookton catena. A Dark Grey Gleisolic type of profile has developed in which it is difficult to observe the horizon differentiation. The original tree cover under which this type developed consisted of elm, ash and cedar. Aspen and willow are common in areas where secondary growth occurs. The following is a description of a Wauseon sandy loam profile occurring under natural forest cover:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–8 inches sandy loam; very dark brown (10 YR 2/2); fine crumb structure; very friable consistency; stonefree; pH — 7.2.

G — 8–14 inches sand; light yellowish brown (10 YR 6/4); mottled; single grain structure; loose consistency; stonefree; pH — 7.2.

C — 14–17 inches sand; very pale brown (10 YR 7/4); mottled; single grain structure; loose consistency; abrupt boundary; pH — 7.6.

D — Clay till or clay; pale brown (10 YR 6/3); massive structure; hard consistency; calcareous; pH — 7.8.

Smooth very gently sloping to depressional topography and poor drainage are characteristics of this type. The profile is stonefree and the surface soil is usually fairly high in organic matter.

**Agriculture**

The use capability of Wauseon sandy loam is limited to a large extent by poor drainage. Drainage improvement will permit the growing of a wider range of crops but it is sometimes difficult to install drains due to the saucer-like topography of some areas. Under natural conditions the soil produces fair crops of pasture or forest. If the drainage were improved and the fertility were maintained, crops similar to those on the Bookton soils could be grown.

## H. SOILS FORMED FROM LACUSTRINE MATERIALS

An extensive area of stonefree clay occurs in the district from Chesley to Lake Huron. These materials were deposited in the still water of some post glacial lake. The Saugeen series is the well drained member of the catena bearing the same name. The Elderslie series is the imperfectly drained member and the Chesley series is the poorly drained member. The Saugeen and Elderslie series exhibit characteristics of the Brown Forest and Grey-Brown Podzolic soils and consequently might be considered as an intergrade between these two Great Groups. The Chesley series is a member of the Dark Grey Gleisolic soils.

In addition to the Chesley series two other poorly drained soils on fine textured lacustrine deposits have been mapped in Bruce County, namely the Toledo and the Ferndale series. These soils have developed on grey and light brownish grey fine textured deposits respectively. The imperfectly and well drained catenary members of these two series do not occur in Bruce County.

### (i) *Good Drainage*

#### Saugeen Silty Clay Loam (28,200 acres)

Developed on pale brown calcareous lacustrine clay, Chesley silty clay loam occurs in the vicinity of Chesley and Paisley. The type is well drained and is characteristic of the Brown Forest — Grey-Brown Podzolic Intergrades. Present woodlots show the tree cover to be mainly elm and soft maple. A profile description of a typical Saugeen silty clay loam profile follows:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–4 inches silty clay loam; grey (10 YR 5/1); fine nuciform structure; friable consistency when dry, plastic when wet; stonefree; pH — 6.3.

$B_1$ — 4–9 inches silty clay loam; yellowish brown (10 YR 5/4); medium nuciform structure; hard consistency when dry, plastic when wet; stonefree; pH — 6.5.

$B_2$ — 9–16 inches clay; brown (10 YR 5/3); coarse blocky to weak columnar structure; very hard consistency when dry, very plastic when wet; stonefree; pH — 6.6.

C — Clay; pale brown (10 YR 6/3); coarse nuciform structure; very hard consistency when dry, very plastic when wet; stonefree; calcareous; pH — 7.6.

*Developed on stonefree, calcareous, clay Elderslie silty clay loam is a Brown Forest—Grey-Brown Podzolic soil. Note the trace of an $A_2$ horizon.*

A light brownish grey, silty clay loam $A_2$ horizon occurs in some places giving the profile characteristics of the Grey-Brown Podzolic soils. The topography is smooth moderately sloping to steeply sloping, the steeper slopes occurring along the stream courses where the land is dissected. The internal drainage is slow but there is sufficient fall toward the stream courses for rapid external drainage. The type has suffered noticeably from sheet and gully erosion.

**Agriculture**

Saugeen soils are well suited to most of the crops commonly grown in the district. They occur in an area where general farming is common and good yields are obtained from fall wheat, spring grain, hay and pasture.

Erosion is severe on most slopes and can be prevented to a large extent by the use of long rotations and other simple farm practices. The topography is such that conservation practices in the form of strip cropping, contour cultivation, etc., can be used successfully.

*Elderslie silty clay loam is a Brown Forest—Grey Brown Podzolic soil. This profile is more typical of the Brown Forest Soils.*

Applications of barnyard manure to maintain the organic matter content, and fertilizer to maintain suitable levels of available plant nutrients, are recommended. Use should be made of soil tests to determine the need for lime.

### Saugeen Clay Loam (1,300 acres)

Differing from the Saugeen silty clay loam in texture, this type presents the same profile characteristics as the former. Nutrient levels are approximately the same and the type supports similar crops and serves about the same land use as the Saugeen silty clay loam.

### Saugeen Silt Loam (8,900 acres)

The Saugeen silt loam has the same profile characteristics as the Saugeen silty clay loam and the Saugeen clay loam, but differs in texture. Although the nutrient levels are slightly lower the type supports similar crops to those of the above mentioned soils.

### *(ii) Imperfect Drainage*

#### Elderslie Silty Clay Loam (50,300 acres)

The topography of the Elderslie silty clay loam is smooth gently sloping, and erosion is slight. Low external drainage and slow internal drainage have produced a characteristic imperfectly drained profile. Soft maple, elm and ash are the trees most commonly found growing in the remaining woodlots.

The characteristics of the Elderslie silty clay loam are shown in the following profile description:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–4 inches silty clay loam; dark grey (10 YR 4/1); fine nuciform structure; friable consistency when dry, plastic when wet; stonefree; pH — 5.8.

$A_2$ — 4–7 inches silty clay loam; light grey (10 YR 7/2); mottled; medium nuciform structure; hard consistency when dry, plastic when wet; stonefree; pH — 5.4.

$B_2$ — 7–12 inches clay; greyish brown (10 YR 5/2); coarse blocky to weak columnar structure; very hard consistency when dry, very plastic when wet; stonefree; pH — 6.5.

C — Clay; pale brown (10 YR 6/3); coarse nuciform structure; very hard consistency when dry, plastic when wet; stonefree; calcareous; pH — 7.8.

The Elderslie exhibits the characteristics of both the Brown Forest and Grey-Brown Podzolic soils. Where Brown Forest profiles occur there is little or no trace of an $A_2$ horizon and there is a tendency for the pH of the various layers to be higher. When the type occurs adjacent to soils developed on till a scattering of stones often appears on the surface.

The level of plant nutrients is medium to high in the virgin soil. The surface reaction is slightly to moderately acid and the organic matter content is medium.

#### Agriculture

Elderslie soils occur in a part of the County used for general farming. Crops grown include oats, barley, red clover, alsike, corn, hay and pasture, and good to fair yields are obtained. Higher yields can often be obtained and a wider range of crops can be grown when drainage is improved.

Elderslie soils respond to applications of commercial fertilizer, which should be added to the soil to maintain an adequate nutrient level. Good soil structure can be preserved in the cultivated soil by additions of barnyard manure, which maintains the organic matter content. Variations in the reaction of the surface soils make soil tests necessary to determine the need for lime.

### Elderslie Clay Loam (5,800 acres)

Elderslie clay loam supports the same crops and serves a similar land use to the Elderslie silty clay loam. The types differ only in surface texture.

### Elderslie Silt Loam (28,700 acres)

The Elderslie silt loam differs from the Elderslie clay loam and silty clay loam in texture and is slightly lower in inherent fertility. However, the type supports a similar kind of agriculture to that of those soils already discussed.

#### (*iii*) *Poor Drainage*

### Chesley Silty Clay Loam (24,900 acres)

Developed on lacustrine materials, Chesley silty clay loam is the poorly drained member of the Saugeen catena and exhibits the characteristics of the Dark Grey Gleisolic Great Soil Group.

The following is a description of a virgin profile:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–5 inches silty clay loam; very dark grey (10 YR 3/1); fine nuciform structure; firm consistency when dry, plastic when wet; stonefree; pH — 6.8.

G — 5–13 inches clay; light brownish grey (2.5 Y 6/2); strongly mottled; massive structure; very plastic consistency when wet, very hard when dry; stonefree; pH — 7.0.

C — Clay; light brownish grey (10 YR 6/2); mottled; coarse blocky structure; very plastic consistency when wet, very hard when dry; stonefree; calcareous; pH — 8.0.

The structure of the G horizon tends to be prismatic under cultivated conditions. The typical poorly drained profile is the result of very low external drainage and slow internal drainage. Since the type occurs on smooth very gently sloping topography, it has not suffered from sheet erosion. The natural vegetation in existing woodlots consists mainly of elm, ash and cedar.

#### Agriculture

A large part of the Chesley series has been cleared and most of it is used for pasture. When weather conditions permit spring planting, good yields of most farm crops can be obtained. Drainage is the chief limitation to crop production. Once drainage has been improved, fertility and organic matter maintenance are of great importance.

Under present conditions there has been little drainage improvement. Alfalfa does not tolerate poor drainage, and consequently the forage crops grown on the Chesley silty clay loam contain only a small percentage of this

***The dark grey surface underlain by a mottled glei layer in the Chesley silty clay loam is typical of the Dark Grey Gleisolic soils***

legume in their composition. The type is fairly well suited to the production of oats, barley, alsike, timothy and pasture.

**Chesley Clay Loam (200 acres)**

One of the minor types occurring in Bruce County, Chesley clay loam differs only in texture from the Chesley silty clay loam. The type has a high natural fertility but requires the use of fertilizer, particularly phosphorus, when cultivated.

**Chesley Silt Loam (5,500 acres)**

Chesley silt loam is similar to the other soil types in the Chesley series in all respects but surface texture. The natural fertility may be slightly lower than that of the silty clay loam or the clay loam.

**Toledo Clay Loam (300 acres)**

Small areas of Toledo clay loam occur in the southern part of the County. It is the poorly drained member of the Brantford catena and is a Dark Grey Gleisolic soil. Elm, ash and cedar trees dominate in the woodlots, and smaller

numbers of soft maple and ironwood also occur. The profile exhibits the following characteristics:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–6 inches clay loam; very dark grey (10 YR 3/1); medium granular structure; friable consistency when dry, plastic when wet; stonefree; pH — 7.2.

$G_1$ — 6–16 inches clay; yellowish brown (10 YR 5/4); strongly mottled; coarse blocky structure; very hard consistency when dry, very plastic when wet; stonefree; pH — 7.4.

$G_2$ — 16–27 inches clay; light yellowish brown (10 YR 6/4); mottled; massive structure; very hard consistency when dry, very plastic when wet; stonefree; pH — 7.4.

C — Clay; grey (10 YR 5/1); massive structure; very plastic consistency when wet, very hard when dry; stonefree; calcareous; pH — 7.8.

The type has a smooth very gently sloping relief and is not affected to any great extent by erosion. Chemical tests show the type to be fairly well supplied with plant nutrients, the chief limitation to crop production being the poor drainage conditions.

**Agriculture**

Most of the type is cleared but is used more for pasture than for crops in rotation. Poor drainage prohibits the growing of some crops, particularly alfalfa, but fair yields of cereal grains can be obtained when weather conditions are good and flooding does not occur. The type is well suited to the production of hay and pasture.

### Toledo Silt Loam (900 acres)

The Toledo silt loam is somewhat coarser in texture than the Toledo clay loam, but is similar in other respects. It serves the same land use and supports similar crops as the Toledo clay loam.

### Ferndale Clay Loam (5,900 acres)

Developed on calcareous lacustrine materials, Ferndale clay loam occurs on the Bruce Peninsula chiefly near Lion's Head. Very slow external drainage and low internal drainage have produced a poorly drained profile characteristic of the Dark Grey Gleisolic soils. The following is a profile description of Ferndale clay loam developed under forest vegetation:

$A_0$ — Thin layer of partially decomposed leaves, twigs, etc.

$A_1$ — 0–6 inches clay loam; very dark greyish brown (2.5 Y 3/2); fine to medium nuciform structure; friable consistency when dry, plastic when wet; stonefree; pH — 7.0.

$G_1$ — 6–14 inches clay; dark greyish brown (2.5 Y 4/2); mottled; medium blocky structure; very hard consistency when dry, very plastic when wet; stonefree; pH — 7.0.

$G_2$ — 14–19 inches clay; grey (5 Y 6/1); mottled; coarse blocky structure; very hard consistency when dry, very plastic when wet; stonefree; pH — 7.3.

C — Clay; light brownish grey (2.5 Y 6/2); medium nuciform structure; very hard consistency when dry, very plastic when wet; stonefree; calcareous; pH — 7.8.

In some areas a somewhat higher surface reaction may occur because of the presence of free carbonates in the $A_1$ horizon. The type has a smooth very gently sloping topography and the original natural vegetation is considered to be mainly ash and elm. Areas of secondary growth occur where alder, poplar and willow form the main tree cover.

**Agriculture**

The Ferndale clay loam is used for general farming. Poor drainage is the greatest limitation to crop production, but crops such as oats, barley, corn and hay produce fairly good yields in dry seasons. However, total crop failures

*The level topography of the Ferndale soils prevents rapid runoff of water and is a factor contributing to poor drainage.*

due to drowning sometimes occur since the soil generally remains waterlogged during rainy periods. Drainage improvement by the use of tile drains and open ditches would increase the capability of the soil to produce a wider range of crops.

The type requires additions of manure to maintain satisfactory soil structure and fertilizers should be added if the drainage is improved.

**Ferndale Silt Loam (2,000 acres)**

Ferndale silt loam is somewhat lower in natural fertility than the Ferndale clay loam because of its coarser texture. However, its coarser texture makes it easier to cultivate.

## I. RECENT ALLUVIAL MATERIALS

**Bottom Land (48,900 acres)**

The low lying soils along stream courses which are subject to flooding are mapped as Bottom Land. Bottom Land is an immature soil and shows little horizon differentiation. The profile usually consists of a deep dark coloured surface underlain by greyish material. The drainage varies but is usually poor. Vegetation consists of willow, elm and cedar. Bulrushes, sedges and marsh grasses occur where the land is flooded for most of the season.

Bottom Land is used largely for pasture but in some locations, where large areas exist, it can be cultivated and used for general farm crops. Before general farm crops can be grown successfully the time and extent of flooding must be considered.

## J. ORGANIC SOILS

### (i) *Very Poor Drainage*

**Muck (66,900 acres)**

Muck soils are made up of well decomposed organic materials and are very dark in colour. The profile of a muck soil usually does not exhibit the characteristic layering of the mineral soils. The following description of a muck soil indicates the arrangement of the layers.

(1) Surface: black (10 YR 2/1); well decomposed organic materials derived from sedges, leaves and other readily decomposable material; variable depth; neutral reaction.

(2) less well decomposed woody material.

(3) sticky; dark in colour; well decomposed.

(4) clay, sand, marl or bedrock.

Muck usually occurs on depressional topography. The drainage is very poor and often muck land is under water for part of the season. The vegetation consists mainly of elm, ash, white cedar and sedges, the latter being the dominant herbaceous plant. The reaction ranges from neutral to slightly alkaline.

**Agriculture**

Most of the muck soils have not been cleared of their natural vegetation and at present are used for forest and recreational purposes. Muck soils have been cultivated only in such places where narrow strips extend into cultivated fields. Such muck areas are best suited for hay, as grain crops usually lodge and fail to fill out and mature properly. A limited area of muck soils could probably be used for the production of certain garden crops, but drainage and irrigation are required for high yields and these improvements are costly. The muck soils have an abundant supply of organic matter and nitrogen, but they are lacking in mineral plant nutrients, especially potash. This deficiency must be corrected for successful crop production on these soils.

**Marsh (1,500 acres)**

The few marshy areas consist of a thin layer of black organic material similar to that of the muck only not so well decomposed over marl, sand or clay. The upper dark layer is usually thin, being less than a foot thick, and the underlying material is usually sand in Bruce County. Marsh land is very wet during all seasons and is not suited to farming purposes.

## K. MISCELLANEOUS SOILS

**Eastport Sand (3,100 acres)**

The Eastport sand is a land type of variable drainage occurring along the shore of Lake Huron, usually in the form of dunes. Vegetative cover is scanty and there is practically no profile development. Where the sand has been stabilized by a vegetative cover, a shallow organic layer may develop underlain by a brownish yellow (10 YR 6/6) horizon which grades into the grey (10 YR 6/1) sandy materials below. Often the organic layer becomes buried by sandy materials blown in from adjoining areas.

The land is usually bare and subject to blowing. Where vegetation has been established it consists of poplar, pine, some white birch and grasses.

The Eastport sand is of no agricultural value and is used for recreational purposes and as building sites for cottages.

**Eastport Gravel (3,100 acres)**

The Eastport gravel consists almost wholly of well sorted cobbles and stones and is of variable drainage. Since the stony materials are too large to be blown from one area to another this type is stabilized, and has a vegetative cover consisting of pine, cedar, poplar and some white birch. There is little profile development. The profile consists of a shallow organic layer underlain by gravel, cobbles and stones.

The type is of no agricultural value and is used for recreational purposes.

**Bridgman Sand (1,500 acres)**

Bridgman sand may be found in areas of the Plainfield, Waterloo or Tioga series where the dark surface soil has been entirely removed by wind and water erosion. It is not unusual to find the sand drifting. Bridgman sand includes the eroded areas and the places where the eroded materials are accumulating.

There is no profile development. It consists of loose, incoherent coarse sand with gravel stones and some boulders. It is very droughty and contains little or no organic matter.

Bridgman sand is a non-agricultural soil. In its present condition the sand is drifting and accumulates on cropland, pastureland and woodland. All such "blow-outs" should be reforested and fenced from livestock.

**Breypen (219,200 acres)**

The Breypen is a land type which occupies a large part of the Bruce Peninsula. It does not consist of any particular soil type but is largely rock outcrop with small pockets of soil of variable materials, drainage, texture and topography occurring within the land type. These areas of soil are too small to be delineated on a map the scale of which is 1 inch to 1 mile. The soil series most commonly found with the rock are the Harkaway, Wiarton, Parkhill and Muck.

Most of the area is used for forest, and hard maple and beech are the dominant species growing on the better drained locations. Elm, ash, cedar, spruce, poplar and white birch are also common. A small part of the Breypen has been cleared and is used largely for permanent pasture, although some of it is cropped and produces only fair crops of spring grains. Under some circumstances the use of the land for pasture may be profitable, particularly if it is adjacent to good farm land on which other feed can be grown. Generally, the Breypen land type is best suited for forest.

***Where the bedrock appears at the surface in the Breypen land type reforestation is recommended.***

# PART IV

# AGRICULTURE AND LAND USE

## Early Settlement and Agricultural Development

The territory now comprising Bruce County was once occupied by the Ojibway Indians. In 1836 the Indians surrendered, by treaty, all of what is now Bruce County except the Bruce Peninsula, part of which is still Indian property. The first permanent settlers arrived in 1848 and settled on the shore of Lake Huron near what are now the towns of Kincardine and Southampton. By 1881 most of the southern portion of the County was settled and settlement had progressed favourably in the northern districts, but the influx of settlers was not nearly so large as that experienced by the townships to the south.

The main occupation of the early settlers consisted of clearing and seeding new land. The families produced almost everything for their own need, and wheat, hay and potatoes were the main crops. The food for livestock and family was produced during the summer months, and the winter months were used for lumbering. By 1881 most of the farms were used for mixed husbandry, but many of the farmers were making preparations to convert to stock raising. This combination of stock farming and dairying has been carried through till the present day, and probably has been instrumental in maintaining soil fertility on many of the Bruce County farms.

There were several markets for agricultural products both within and outside the County. Shipping facilities for those living near Lake Huron or Georgian Bay were good, but those who lived inland had nothing but poor roads and trails through the bush over which they had to travel to get their produce to market. The Report of the Agricultural Commission for 1881 indicates that there were eight cheese factories, three creameries and four flour mills in the County at that time. There were also several tanneries, woollen mills and foundries dependent on the farming community. Extensive salt wells at Kincardine provided salt for the pork packers at home and in the United States, and for fertilizer, for grain, meadows and turnips.

## Present Agriculture

Agricultural endeavour in Bruce County now consists mainly of livestock raising and mixed farming. Dairying is important, although there are not nearly so many farms used for it as there are for stock raising. A few specialized crops are grown in the County, tobacco being one that has been grown only in recent years.

The present status of land use in Bruce County is indicated in Table 8.

### TABLE 8

### PRESENT LAND USE

| | Acres | % of Total |
|---|---|---|
| Total land area | 1,056,000 | 100.0 |
| Area occupied land | 793,741 | 75.1 |
| Area improved land | 543,428 | 51.4 |
| Area unimproved land | 250,313 | 23.7 |

Because of road allowances and the amount of rough, rocky land occurring in the County only 75.1 per cent of the total land area is occupied. Of this

*Bruce County is a leading producer of oats in the Province of Ontario.*

area 51.4 per cent has increased in value through the efforts of the owner, and is called improved land. The remaining 23.7 per cent of the occupied land is unimproved and consists of woodland, natural pasture and waste land. As indicated in Table 9 the improved land consists of:

TABLE 9

PRESENT USE OF IMPROVED LAND

| | Acres | % of Total |
|---|---|---|
| Field crops | 311,067 | 57.2 |
| Pasture | 200,033 | 36.9 |
| Fallow | 19,155 | 3.5 |
| Orchard | 111 | ..... |
| Market Garden | 34 | ..... |
| Small Fruits | 31 | ..... |
| Other | 12,997 | 2.4 |

Approximately 94 per cent of the improved land supports pasture and field crops. The large proportion of pasture is desirable in an area where many of the farms are devoted to stock raising. Only small acreages are used for orchards, market gardens and small fruits, and these are located chiefly near Lake Huron where the climate is moderated by the presence of the large body of water.

The acreages of the various field crops grown in the County for 1948 are shown in Table 10. These figures are taken from the Annual Report of the Statistics Branch (1948), Ontario Department of Agriculture. The total acreage of field crops (323,090) differs slightly from that of the 1941 Census (311,067), because the records apply to two different years. The following table shows the predominance of hay and clover, oats, mixed grain, alfalfa and fall wheat in the acreage of field crops of Bruce County. The County is one of the major flax producers in the Province, but has small acreages of other cash crops. The proportion of field crops grown presents a picture of the dominant type of

agriculture in the area. Large acreages of hay and clover, permanent pasture, alfalfa, oats and mixed grain contribute to successful stock raising and dairy farming.

## TABLE 10

### ACREAGE OF FIELD CROPS IN BRUCE COUNTY REPORT OF THE STATISTICS BRANCH (1948), ONTARIO DEPARTMENT OF AGRICULTURE

| | Acres | |
|---|---|---|
| Hay and Clover | 110,400 | |
| Alfalfa | 30,600 | 141,000 |
| Oats | 61,000 | |
| Mixed Grain | 53,500 | |
| Fall Wheat | 28,800 | |
| Barley | 12,200 | |
| Buckwheat | 2,340 | |
| Rye | 1,500 | |
| Spring Wheat | 1,500 | 160,840 |
| Flax | 9,600 | |
| Corn (fodder) | 4,800 | |
| Potatoes | 1,890 | |
| Turnips | 1,800 | |
| Peas | 1,670 | |
| Corn (husking) | 760 | |
| Mangels | 510 | |
| Soybeans | 180 | |
| Beans | 40 | 21,250 |
| Total Field Crops | | 323,090 |
| Seeded Pasture | | 146,500 |

The proportion of woodland, natural pasture and marsh making up the unimproved land occurring in the County is shown in Table 11.

## TABLE 11

### PRESENT USE OF UNIMPROVED LAND

| | Acres | % of Total |
|---|---|---|
| Woodland | 120,170 | 48.1 |
| Natural Pasture | 87,900 | 35.1 |
| Marsh | 42,243 | 16.8 |
| Total | 250,313 | 100.0 |

Most of the natural pasture and woodland is in the Bruce Peninsula, where much of the soil occurs in small patches surrounded by rock outcrop. Natural pasture is also found on the bottom land adjoining stream courses. Little of the muck has been developed for the production of cultivated crops, and it usually supports a tree cover of elm, ash, cedar and spruce.

The following table, from the 1941 Census, gives a generalized picture of the types of farms occurring in Bruce County.

## TABLE 12

### TYPES OF FARM OCCURRING IN BRUCE COUNTY (1940)

| | |
|---|---|
| Total number of farms | 5,657 |
| Livestock | 2,584 |
| Mixed farming | 1,146 |
| Subsistence and combinations of subsistence | 991 |
| Dairy products | 118 |
| Part-time | 113 |
| Grains and hay | 102 |
| Poultry | 49 |
| Forest and apiary products | 48 |
| Vegetables, fruits and nursery products | 13 |
| Potatoes, roots and other field crops | 5 |

Mixed farms are farms where the revenue from two or more of the other main types of products are required to produce 50 per cent or more of the gross revenue. Farms on which the value of the products used by the farm household amounted to 50 per cent or more of the gross farm revenue are classed as subsistence farms. Combinations of subsistence farms are farms where the value of the products used and the revenue from another main type, such as poultry, livestock, etc., were required to form 50 per cent or more of the gross farm revenue.

### Utilization and Management of Bruce County Soils

The use of different soils in an area is determined by physical, economic and social factors. One of the aims in the operation of a farm is to adjust the use of the soils as nearly as practicable to their physical limitations, although social and economic conditions of the surrounding locality may necessitate, at times, a use of the soil that is out of accord with the physical limitations of those soils. When suitable uses have been assigned to the land, the matter of management of each soil logically follows.

The soils of Bruce County have been grouped on a textural basis for the purpose of discussing their use and management. Some soils have been placed in a miscellaneous grouping because the texture varies. Muck and marsh are grouped under organic soils. The distribution of the textural classes is shown in Fig. 13.

### I. Sand and Sandy Loam Soils

#### (a) *Excessive Drainage*

| Soil Type | Acreage | % of Total |
|---|---|---|
| Plainfield sand | 15,200 | 1.4 |
| Bridgman sand | 1,500 | 0.1 |
| | 16,700 | 1.5 |

As pointed out in Part III, the components of this group vary only in the amount of erosion that has occurred, the Bridgman sand being highly wind-eroded. The soils of this group are very low in fertility and productivity, contain little organic matter, and have a very low water holding capacity. These soils are highly susceptible to wind erosion, as evidenced by the Bridgman sand which consists of "blow-outs" devoid of vegetation. A permanent cover of trees is considered to be the best use for the Plainfield sand and Bridgman sand.

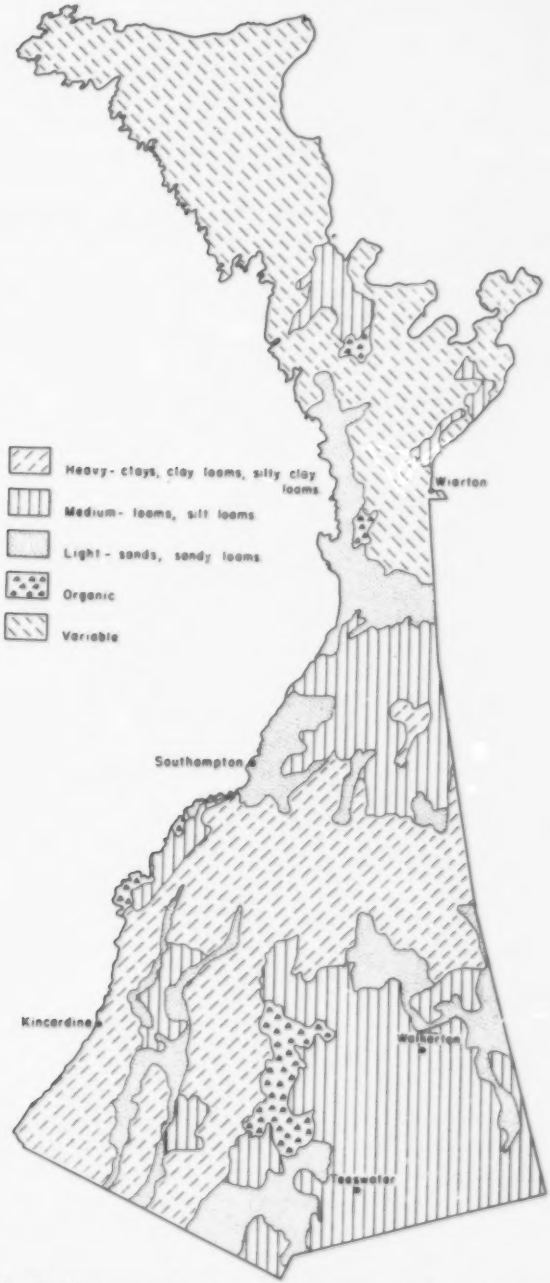



*FIG. 13—Outline map showing the distribution of textural classes.*

### (b) *Good Drainage*

| Soil Type | Acreage | % of Total |
|---|---|---|
| Fox sandy loam | 20,700 | 1.9 |
| Tioga sandy loam | 7,100 | 0.6 |
| Tioga sand | 100 | ..... |
| Sullivan sandy loam | 2,600 | 0.3 |
| Sullivan sand | 1,900 | 0.1 |
| Bookton sandy loam | 400 | ..... |
| Waterloo sandy loam | 31,600 | 3.0 |
| Donnybrook sandy loam | 29,400 | 2.8 |
| Total | 94,800 | 8.7 |

The Fox, Tioga and Sullivan series are low in fertility, low in organic matter and low in moisture holding capacity. All are susceptible to wind erosion, although the problem is not so great as on the excessively drained sands. Soil loss can be prevented to a great extent by keeping the land under cover for as long as possible. As these soils are rather low in fertility and organic matter, applications of fertilizer and additions of barnyard manure are especially necessary and important. All the common fertilizer elements are needed for most crops, and lime may be required on the Tioga soils. The Fox, Tioga and Sullivan series are fairly well suited to the production of a wide variety of crops, but adequate amounts of fertilizer must be added to obtain good crop yields. Crops that are resistant to drought or crops that make their maximum growth during periods of high rainfall need to be selected because of the low moisture holding capacity. Specialized crops such as tobacco, tree fruits and vegetables do well where climate permits.

The Bookton series has management problems similar to those of the Fox, Tioga and Sullivan series except that deep rooted plants can obtain more food from the underlying clay. The underlying clay also provides more moisture for plant growth, because of its high moisture holding capacity.

The Waterloo and Donnybrook series are irregular steeply sloping and are susceptible to erosion. Most farm crops can be grown on the more gentle slopes. The steep slopes might well be returned to a permanent cover of grass or trees. Applications of fertilizer and additions of barnyard manure are needed to increase the low fertility and organic matter contents of these soils.

### (c) *Imperfect Drainage*

| Soil Type | Acreage | % of Total |
|---|---|---|
| Brady sandy loam | 17,400 | 1.6 |
| Berrien sandy loam | 24,600 | 2.3 |
| Total | 42,000 | 4.9 |

Occurring on smooth very gently sloping topography, the Brady and Berrien series are susceptible to erosion, but not to the same degree as the well drained sandy loams. These soils have a low fertility level and require applications of all the common fertilizer elements for adequate crop growth. Some crops grown on the Berrien sandy loam can obtain more plant food from the more fertile underlying clay. The soils are fairly well suited to oats, red clover, timothy, and some specialized crops. Cash crops such as tree fruits and tobacco can be grown where the climate permits. A wider range of crops can be grown if the drainage is improved.

*The Donnybrook soils are usually a good source of gravel for road building, etc.*

### (*d*) *Poor Drainage*

| Soil Type | Acreage | % of Total |
|---|---|---|
| Granby sandy loam | 9,100 | 0.8 |
| Wauseon sandy loam | 7,200 | 0.6 |
| Total | 16,300 | 1.4 |

The poorly drained sands and sandy loams occupy a very small part of the total land area in the County. Drainage improvement is the main requirement for successful land use on these soils. The installation of tiles may be difficult, particularly on the Wauseon series, because of the difficulty in obtaining an outlet. When drainage improvement is effected care must be taken to maintain soil fertility and organic matter levels through the application of fertilizers and barnyard manure.

At the present time these soils support poor pasture consisting of native grasses or are under tree cover. Cultivated crops can be grown with moderate success when the drainage is improved.

## II. Loams and Silt Loams

### (*a*) *Good Drainage*

| Soil Type | Acreage | % of Total |
|---|---|---|
| Dumfries loam | 11,700 | 1.1 |
| Osprey loam | 800 | |
| Harriston loam | 79,900 | 7.5 |
| Harriston silt loam | 2,000 | 0.2 |
| Harkaway silt loam | 10,100 | 1.0 |
| Harkaway silt loam — stony phase | 43,700 | 4.1 |
| Harkaway loam | 1,700 | 0.1 |
| Harkaway loam — stony phase | 3,800 | 0.3 |
| Teeswater silt loam | 17,100 | 1.6 |
| Sargent loam | 5,300 | 0.5 |
| Burford loam | 10,500 | 1.0 |
| Total | 186,600 | 17.4 |

Approximately 17 per cent of the total land area is composed of loam and silt loam soils developed on medium textured till or gravelly materials. The Dumfries, Osprey, Harriston and Harkaway series are susceptible to erosion and all of the group respond to fertilization.

The Dumfries and Osprey series occur on irregular steeply sloping topography and are susceptible to sheet erosion. Because of the complex relief, erosion must be controlled by long rotations, cover crops and other simple practices. The steeper slopes should be left under a permanent cover of grass or trees. Numerous stones hinder cultivation, and fertility is lower than is general for the other soils in this group. The suitability of these soils to the production of cereal grains, hay and pasture is only fair. For best results applications of phosphatic, potassic and nitrogenous fertilizers and additions of barnyard manure are required.

The Harriston series produces good yields of most farm crops with the use of satisfactory rotations and good soil management. Occurring on smooth moderately sloping topography the Harriston series is susceptible to erosion, but this hazard can be adequately controlled by the use of relatively simple erosion control measures. Crop response can usually be obtained by additions of fertilizer. Commercial fertilizers most commonly used by the farmers for grain and pastures are 3-18-9 and 2-16-6, while 4-12-10 is used for potatoes, corn, roots and gardens. Barnyard manure should be added to maintain the organic matter content.

The Harkaway series has soil management problems somewhat similar to those of the Harriston except for the stony phase, where large numbers of stones on the surface interfere with cultivation. Control of run-off is important because the long smooth slopes increase the danger of erosion. Ordinarily, reasonable care in tillage, fertilization, and the selection of rotations will provide the necessary control of erosion. Where possible, tillage should be on the contour. The series is well suited to the production of cereal grains, hay, clover and pasture. The high lime content of these soils and their good drainage makes them ideal for the production of alfalfa.

The Teeswater series is developed from silty alluvial deposits over gravel and has smooth gently sloping topography. The soil is adapted to a wide range of field crops such as alfalfa, clover, corn, pasture, oats and barley. It is also suited to special crops such as small fruits, market garden crops and to orchards. The land can be used for both early and late crops. Variations in yields from year to year are not so great as on some other soils, and in wet years they are one of the most productive soils of the area. Teeswater soils are easy to cultivate except where stoniness occurs due to the removal of the stonefree overburden by erosion. Their fertility is fair to moderate and best fertilizer responses are obtained with superphosphate and some nitrogen on most farm crops, while legumes respond also to potash fertilization. Water erosion is not a serious problem but may be harmful on the steeper slopes near the rivers if control measures are not used.

The Sargent and Burford series occur on smooth gentle slopes and are developed on gravelly outwash materials. A complete description of these soils is given in Part III. The chief limitation to crop production is low natural fertility. The soils are adapted to a wide range of crops, and yields are good

*Good wheat crops are produced on Teeswater silt loam.*

when adequate amounts of fertilizer have been added to the soils. Barnyard manure and green manuring are necessary for the maintenance of the content of organic matter. These soils are well suited to the production of tree fruits, small fruits and vegetables where the climate is sufficiently moderate to permit their growth.

### (*b*) *Imperfect Drainage*

| Soil Type | Acreage | % of Total |
|---|---|---|
| Killean loam | 100 | ..... |
| Listowel loam | 16,900 | 1.6 |
| Listowel silt loam | 6,400 | 0.6 |
| Listowel loam — stony phase | 1,900 | 0.1 |
| Wiarton loam | 3,500 | 0.3 |
| Brisbane loam | 1,600 | 0.1 |
| Total | 32,000 | 2.8 |

The imperfectly drained loam and silt loam soils occupy about 3 per cent of the County area. The range of crops that can be grown on these soils is limited by unsatisfactory drainage. The installation of tile drains will benefit the soils. Stones occurring on the surface of the Killean loam and the stony phase of the Listowel loam interfere with cultivation and should be removed. Although superphosphate is the main fertilizer required on these soils, potash will likely give favourable response, particularly on the Wiarton and Brisbane soils. Manure will benefit all crops, especially after drainage has been improved. The soils are fairly well suited to cereal grains, hay, red clover and pasture. Alfalfa is difficult to grow unless the soils have been drained efficiently.

### (*c*) *Poor Drainage*

| Soil Type | Acreage | % of Total |
|---|---|---|
| Parkhill loam | 8,400 | 0.8 |
| Parkhill silt loam | 2,600 | 0.2 |
| Gilford loam | 900 | ..... |
| Total | 11,900 | 1.0 |

The poorly drained loams and silt loams found in the County usually occur as small areas in association with the better drained soils. Because of their depressional position in relation to the surrounding better soils they are often difficult to drain. However, the provision of improved drainage, although difficult and costly, is essential for the best utilization of these soils. When drainage is improved, fertility and organic matter must be maintained through the use of fertilizers and manure. The soils in this group are used for pasture or woodlot.

### III. Silt Loams, Silty Clay Loams, and Clay Loams

#### (a) *Good Drainage*

| Soil Type | Acreage | % of Total |
|---|---|---|
| Huron clay loam | 9,600 | 0.9 |
| Huron silt loam | 4,900 | 0.4 |
| Vincent clay loam | 900 | ..... |
| Vincent silt loam | 600 | ..... |
| Dunedin clay loam | 2,700 | 0.2 |
| Saugeen silty clay loam | 28,200 | 2.7 |
| Saugeen clay loam | 1,300 | 0.1 |
| Saugeen silt loam | 8,900 | 0.8 |
| Total | 57,100 | 5.1 |

All the soils of this group are well suited to the production of crops and are chiefly used for that purpose. Susceptible to erosion, some of these soils have lost a large part of their surface soil, particularly where slopes are steep along the stream courses. Most soil loss can be prevented by the use of long rotations and cover crops. So far as practicable, tillage should be on the contour on the steeper slopes. Tillage should ordinarily be avoided when the soils are very wet or very dry, although the range in moisture content that will allow safe tillage is fairly wide.

Fertilization is important, as all these soils need fertilizers for the continued production of medium to high yields of crops. Phosphate is needed for all crops, particularly for legumes and grasses. Nitrogen is a general requirement except where it is supplied by legumes. Potash may be a requirement for these soils, particularly for crops that are high potash feeders. The use of green manure and barnyard manure is necessary for the maintenance of the content of organic matter.

The members of this group have a wide range in adaptability to various kinds of crops, and their requirements with regard to the selection of crops are therefore not exacting. It is important, however, to grow the selected crops in the proper rotation if the productivity of the soils is to be maintained or increased. Row crops need to be alternated with close growing crops, and the periodic growth of deep-rooted crops is beneficial. A rotation consisting of corn one year, small grain one year and clover or clover and grass one year appears to be well suited to these soils where the slopes are not too steep. However, where soil loss occurs clover and grass should be grown for a longer period of time. If the land is adequately fertilized, alfalfa does very well, and as it is a deep-rooted crop its periodic production is to be encouraged.

### (b) *Imperfect Drainage*

| Soil Type | Acreage | % of Total |
|---|---|---|
| Perth clay loam | 53,300 | 5.0 |
| Perth silt loam | 14,600 | 1.4 |
| Kemble clay loam | 1,500 | 0.1 |
| Kemble silt loam | 600 | ..... |
| Elderslie silty clay loam | 50,300 | 4.8 |
| Elderslie clay loam | 5,800 | 0.5 |
| Elderslie silt loam | 28,700 | 2.7 |
| Total | 155,600 | 14.5 |

These soils are smooth gently sloping and have developed from clay tills or stonefree clays. Their natural fertility is high, but due to some undesirable physical characteristics their productivity level is influenced by climatic conditions. Artificial drainage would benefit all these soils, permitting a wider range of crops to be grown.

These soils are well suited to the dairying and mixed farming for which they are generally used. The field crops usually grown are oats, silage corn, fall wheat, clovers and timothy, and roots, while the main cash crop is flax. Alfalfa may be grown on land properly drained, but due to difficulties in establishing and maintaining the stands it is seldom grown alone but rather in mixtures of clovers and timothy. The geographical location of these soils does not permit the production of market garden crops because of cool climate, but peas and beans may be grown profitably. Crop yields on these soils are best in years of average rainfall. Crop failures are due mainly to rainy spring weather which delays seeding time, germination and growth.

Because of their gently sloping topography, these soils are adapted to the use of any type of farm machinery, but the cultivation of the land requires much power. Cultivation should be avoided when the soil is especially wet or dry so that soil structure will not be destroyed. The response to chemical fertilization depends much on climatic conditions. Phosphatic fertilizers are most commonly used and give favourable responses. Barnyard or green manure will help to maintain organic matter, favour granulation and improve permeability, and should be used particularly when drainage is improved.

### (c) *Poor Drainage*

| Soil Type | Acreage | % of Total |
|---|---|---|
| Brookston clay loam | 60,200 | 5.7 |
| Brookston silt loam | 2,000 | 0.2 |
| Morley clay loam | 400 | ..... |
| Chesley silty clay loam | 24,900 | 2.3 |
| Chesley clay loam | 200 | ..... |
| Chesley silt loam | 5,500 | 0.5 |
| Toledo clay loam | 300 | ..... |
| Toledo silt loam | 900 | ..... |
| Ferndale clay loam | 5,900 | 0.5 |
| Ferndale silt loam | 2,000 | 0.2 |
| Total | 102,300 | 9.4 |

These soils consist of very gently sloping to level, usually stonefree land and are characterized by poor drainage. Because of poor drainage these soils are not well suited to the production of crops requiring tillage. Artificial drainage is essential for the best utilization of these soils.

The kind of crops and the success with which they can be grown depend upon improvement in drainage. General farming is commonly practised and the main crops grown are hay, grain and pastures. Timothy, alsike and to a lesser extent red clover produce satisfactory crops. The yield of grain varies considerably from year to year and the best crops are obtained in dry years, whereas in wet years they may be a failure. Where these soils are used for pasture, their management entails chiefly the selection of water-tolerant plants and the eradication of weeds. Where artificial drainage is adequate these soils are suitable for peas, beans, flax and other specialized crops.

Early crops cannot be produced on any of these soils because the land is slow to dry and warm up in the spring. Superphosphate is the main fertilizer required on these soils. When soil drainage is improved, barnyard or green manure applications are needed to maintain the level of organic matter.

### IV. Miscellaneous

| Soil Type | Acreage | % of Total |
|---|---|---|
| Bottom land | 48,900 | 4.6 |
| Eastport sand | 3,100 | 0.3 |
| Eastport gravel | 3,100 | 0.3 |
| Breypen land type | 219,200 | 20.7 |
| Total | 274,300 | 25.9 |

Although the members of this group differ greatly from one another, they are, with few exceptions, physically unsuitable for the production of crops requiring tillage, poorly suited for pasture, and under present conditions best suited, in most places, for forestry. The Eastport sand usually occurs along the Lake Huron shore and is used as a site for summer cottages. The Breypen land type consists largely of rock outcrop — and the small areas of soil occurring in association with the rock can be used for pasture, although their use for such a purpose is hardly feasible in most places. It is considered that the Breypen land type and the Eastport gravel are best used for trees. The Bottom Land is generally used for grazing purposes. The requirements for management of these soils entail chiefly the eradication of weeds, and the proper control of grazing.

### V. Organic Soils

| Soil Type | Acreage | % of Total |
|---|---|---|
| Muck | 66,900 | 6.3 |
| Marsh | 1,500 | 0.1 |
| Total | 68,400 | 6.4 |

The organic soils are not extensively used for farm crops, and are usually wooded. The muck soils are suited to intensive farming and especially to market gardening. The most productive muck soils are those that can be irrigated as well as drained. The organic soil is rich in nitrogen but lacks the mineral elements such as phosphorus and potassium, which must be supplied as commercial fertilizer.

Since the organic layer on the marsh soil is much shallower than that of the muck it is not as well suited to intensive farming. It is probably best used for forest.

**Adaptability Rating for Bruce County Soils**

In rating the soils of Bruce County consideration is given to the soil type — crop relationship with particular reference to the comparative suitability of individual soil types for specific crops grown in the area. The suitability of soils to produce crops will vary according to differences in texture, structure, organic matter, reserve of plant nutrients and their availability, stoniness, depth to bedrock, etc.

The ratings given in the following tables (13, 14, 15, 16, 17, 18) are obtained by weighing the characteristics of the soil in relation to their effect upon the production of a particular crop. Purely scientific ratings are rather difficult to obtain, due to the many factors that influence crop production on the various soil types. If crop yields could be collected under specific management from sample areas well distributed over a soil type area, and for a sufficient number of years to eliminate differences due to climate, crop ratings would probably be quite accurate. However, such a collection of data would be costly and time-consuming.

Comparative ratings for the different soils of Bruce County according to their capability to produce crops commonly grown in the County are given only in descriptive terms because of lack of definite information on yields of many of the crops. The rating is based on observations made during the course of the soil survey, by data and opinions furnished by agronomic and soil workers familiar with the area, and by consultation with local farmers and others. No rating has been given where a crop is not commonly grown.

Although crop yields vary considerably from year to year and from farm to farm on the same soil type, an attempt has been made to arrive at an average yield of the main crops grown on each soil type in the area surveyed. These average acre-yields, which are based on information obtained from farmers and on personal estimates, are compiled in Table (19). They represent average estimated yields for a number of years, under prevailing farm practices. Yield data have been given only for those crops for which reasonably accurate information could be obtained.

## TABLE 13

### CROP ADAPTABILITY RATINGS FOR GOOD CROPLAND*

| Soil Type | Wheat | | Oats | | Barley | | Alfalfa | | Red Clover | | Alsike | | Timothy | | Flax | | Fodder Corn | | Pasture | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | † N.D. | ‡ T.D. | N.D. | T.D | N.D. | T.D. | N.D. | T.D. | N.D. | T D. | N.D. | T D | N.D. | T D. | N.D. | T.D. | N.D. | T.D | N D. | T D |
| Teeswater silt loam | G | | G | | G | | G | | G | | G | | G | | G | | G | | G | |
| Harriston silt loam | G | | G | | G | | G | | G | | G | | G | | G-F | | G-F | | G | |
| Harriston loam | G | | G | | G | | G | | G | | G | | G | | G-F | | G-F | | G | |
| Huron silt loam | G | | G | | G | | G | | G | | G | | G | | G-F | | G-F | | G | |
| Huron clay loam | G | | G | | G | | G | | G | | G | | G | | G-F | | G-F | | G | |
| Harkaway silt loam | G-F | | G | | G | | G | | G | | G | | G | | G-F | | F | | G | |
| Harkaway loam | G-F | | G | | G | | G | | G | | G | | G | | G-F | | F | | G | |
| Vincent silt loam | G-F | | G | | G | | G | | G | | G | | G | | G-F | | F | | G | |
| Vincent clay loam | G-F | | G | | G | | G | | G | | G | | G | | G-F | | F | | G | |
| Saugeen silt loam | G-F | | G | | G | | G-F | | G | | G | | G | | G-F | | F | | G | |
| Saugeen silty clay loam | G-F | | G | | G | | G-F | | G | | G | | G | | G-F | | F | | G | |
| Saugeen clay loam | G-F | | G | | G | | G-F | | G | | G | | G | | G-F | | F | | G | |
| Dunedin clay loam | | | G | | G | | G-F | | G | | G | | G | | G-F | | F | | G | |

* The crop adaptability rating for each soil as follows:
G — Good; G-F — Good to Fair; F — Fair; F-P — Fair to Poor; P — Poor.

† N.D. — Natural Drainage. ‡ T.D. — Tile Drainage.

## TABLE 14

### CROP ADAPTABILITY RATINGS FOR GOOD TO FAIR CROPLAND*

| Soil Type | Wheat | | Oats | | Barley | | Alfalfa | | Red Clover | | Alsike | | Timothy | | Flax | | Fodder Corn | | Pasture | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | † N.D. | ‡ T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. |
| Listowel loam | F | G-F | G-F | G | F | G | F | G-F | G-F | G | G | G | G | G | G-F | G | G-F | G | G | |
| Listowel silt loam | F | G-F | G-F | G | F | G | F | G-F | G-F | G | G | G | G | G | G-F | G | G-F | G | G | |
| Perth silt loam | F | G-F | G-F | G | F | G | F | G-F | G-F | G | G | G | G | G | G-F | G | F | G-F | G | |
| Perth clay loam | F | G-F | G-F | G | F | G | F | G-F | G-F | G | G | G | G | G | G-F | G | F | G-F | G | |
| Elderslie silt loam | F | G-F | G-F | G | F | G-F | F-P | F | G-F | G | G | G | G | G | G-F | G | F | G-F | G | |
| Elderslie silty clay loam | F | G-F | G-F | G | F | G-F | F-P | F | G-F | G | G | G | G | G | G-F | G | F | G-F | G | |
| Elderslie clay loam | F | G-F | G-F | G | F | G-F | F-P | F | G-F | G | G | G | G | G | G-F | G | F | G-F | G | |
| Wiarton loam | | | G-F | G | F | G | F | G-F | G-F | G | G | G | G | G | G-F | G | F | G-F | G | |
| Wiarton silt loam | | | G-F | G | F | G | F | G-F | G-F | G | G | G | G | G | G-F | G | F | G-F | G | |
| Kemble silt loam | | | G-F | G | F | G | F | G-F | G-F | G | G | G | G | G | G-F | G | F | G-F | G | |
| Kemble clay loam | | | G-F | G | F | G | F | G-F | G-F | G | G | G | G | G | G-F | G | F | G-F | G | |
| Burford loam | G-F | | G-F | | G-F | | F | | F | | F | | F | | F | | G-F | | G-F | |
| Brookston clay loam | P | G-F | F | G | P | F | P | F | F | G-F | F | G | F | G | F | G-F | F-P | G-F | G-F | |
| Brookston silt loam | P | G-F | F | G | P | F | P | F | F | G-F | F | G | F | G | F | G-F | F-P | G-F | G-F | |
| Toledo clay loam | P | G-F | F | G | P | F | P | F | F | G-F | F | G | F | G | F | G-F | F-P | G-F | G-F | G |
| Toledo silt loam | P | G-F | F | G | P | F | P | F | F | G-F | F | G | F | G | F | G-F | F-P | G-F | G-F | G |
| Chesley clay loam | P | G-F | F | G | P | F | P | F | F | G-F | F | G | F | G | F | G-F | F-P | G-F | G-F | G |
| Chesley silty clay loam | P | G-F | F | G | P | F | P | F | F | G-F | F | G | F | G | F | G-F | F-P | G-F | G-F | G |
| Chesley silt loam | P | G-F | F | G | P | F | P | F | F | G-F | F | G | F | G | F | G-F | F-P | G-F | G-F | G |
| Craigleith clay loam | | | F | G | F-P | F | F-P | F | F | G-F | F | G | F | G | F | G-F | F-P | G-F | F | G |
| Ferndale clay loam | | | F | G | P | F | P | F-P | F | G-F | F | G | F | G | F | G-F | F-P | G-F | G-F | G |
| Ferndale silt loam | | | F | G | P | F | P | F-P | F | G-F | F | G | F | G | F | G-F | F-P | G-F | G-F | G |

* The crop adaptability rating for each soil as follows:
G — Good; G-F — Good to Fair; F — Fair; F-P — Fair to Poor; P — Poor.

† N.D. — Natural Drainage. ‡ T.D. — Tile Drainage

## TABLE 15

### CROP ADAPTABILITY RATINGS FOR FAIR CROPLAND*

| Soil Type | Wheat | | Oats | | Barley | | Alfalfa | | Red Clover | | Alsike | | Timothy | | Flax | | Fodder Corn | | Pasture | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | † N.D. | ‡ T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. |
| Sargent loam | | | F | | F | | G–F | | G–F | | G–F | | F | | F | | F | | F | |
| Bookton sandy loam | F | | F | | F–P | | F | | F | | G–F | | F | | F | | F | | F | |
| Fox sandy loam | F | | F | | F | | F–P | | F | | F | | F | | P | | F–P | | F | |
| Harkaway silt loam—stony phase | F | | F | | F | | F | | F | | F | | F | | P | | P | | G–F | |
| Harkaway loam—stony phase | F | | F | | F | | F | | F | | F | | F | | P | | P | | G–F | |
| Dumfries loam | F | | F | | F–P | | F | | F | | G–F | | F | | P | | F–P | | F | |
| Sullivan sandy loam | F | | F | | F–P | | F | | F | | G–F | | F | | P | | F–P | | F | |
| Parkhill silt loam | P | F–P | F–P | F | P | F–P | P | F–P | P | F | F | G–F | F | G–F | P | F | P | F | F | G–F |
| Parkhill loam | P | F–P | F–P | F | P | F–P | P | F–P | P | F | F | G–F | F | G–F | P | F | P | F | F | G–F |
| Osprey loam | F–P | | F–P | | F–P | | F | | F | | F | | F | | P | | F–P | | F | |

* The crop adaptability rating for each soil as follows:
G — Good; G–F — Good to Fair; F — Fair; F–P — Fair to Poor; P — Poor.

† N.D. — Natural Drainage. ‡ T.D. — Tile Drainage.

## TABLE 16

### CROP ADAPTABILITY RATINGS FOR FAIR TO POOR CROPLAND*

| Soil Type | Wheat | | Oats | | Barley | | Alfalfa | | Red Clover | | Alsike | | Timothy | | Flax | | Fodder Corn | | Pasture | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | † N.D. | ‡ T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. |
| Donnybrook sandy loam | F-P | | F-P | | P | | F | | F | | F | | F-P | | P | | P | | F | |
| Waterloo sandy loam | F-P | | F-P | | P | | F | | F | | F | | F-P | | P | | P | | F | |
| Sullivan sand | | | F-P | | P | | F-P | | F | | F | | F-P | | P | | P | | F-P | |
| Tioga sandy loam | | | F-P | | P | | P | | F-P | | F | | F-P | | P | | P | | F | |
| Killean loam | P | F-P | F-P | F | P | F-P | P | P | P | F | F | G-F | P | F | P | F-P | P | F | F | F |
| Brady sandy loam | P | F-P | F-P | F | P | P | P | P | P | F-P | F-P | F-P | P | F-P | P | P | P | F-P | F-P | F-P |
| Berrien sandy loam | P | F-P | F-P | F-P | P | P | P | F-P | P | F-P | F-P | F | P | F | P | F-P | P | F-P | F-P | F |
| Tioga sand | | | F-P | | P | | P | | P | | F-P | | P | | P | | P | | F-P | |

* The crop adaptability rating for each soil as follows:
G — Good; G-F — Good to Fair; F — Fair; F-P — Fair to Poor; P — Poor.

† N.D. — Natural Drainage. ‡ T.D. — Tile Drainage.



## TABLE 17

### CROP ADAPTABILITY RATINGS FOR POOR CROPLAND*

| Soil Type | Wheat | | Oats | | Barley | | Alfalfa | | Red Clover | | Alsike | | Timothy | | Flax | | Fodder Corn | | Pasture | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | † N.D. | ‡ T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. |
| Gilford loam | P | F-P | P | F-P | P | F-P | P | P | P | F-P | P | F | P | F-P | P | P | P | P | F-P | F-P |
| Morley clay | | | P | F-P | P | F-P | P | P | P | F-P | P | F-P | F-P | F | P | P | P | P | F | F |
| Wauseon sandy loam | P | F-P | P | F-P | P | F-P | P | P | P | F-P | P | F | P | F-P | P | F-P | P | F-P | P | F-P |
| Granby sandy loam | P | F-P | P | F-P | P | F-P | P | P | P | F-P | P | F | P | F-P | P | P | P | P | P | F-P |

* The crop adaptability rating for each soil as follows:
G — Good; G-F — Good to Fair; F — Fair; F-P — Fair to Poor; P — Poor.

† N.D. — Natural Drainage. ‡ T.D. — Tile Drainage.

## TABLE 18

### CROP ADAPTABILITY RATINGS FOR SUBMARGINAL CROPLAND*

| Soil Type | Wheat | | Oats | | Barley | | Alfalfa | | Red Clover | | Alsike | | Timothy | | Flax | | Fodder Corn | | Pasture | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | † N.D. | ‡ T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. | N.D. | T.D. |
| Breypen land type | — | | — | | — | | — | | — | | — | | — | | — | | — | | F–P | |
| Plainfield sand | — | | — | | — | | — | | — | | — | | — | | — | | — | | P | |
| Listowel loam—stony phase | — | | — | | — | | — | | — | | — | | — | | — | | — | | P | |
| Bridgman sand | — | | — | | — | | — | | — | | — | | — | | — | | — | | — | |
| Eastport sand | — | | — | | — | | — | | — | | — | | — | | — | | — | | — | |
| Eastport gravel | — | | — | | — | | — | | — | | — | | — | | — | | — | | — | |
| Marsh | — | | — | | — | | — | | — | | — | | — | | — | | — | | — | |

* The crop adaptability rating for each soil as follows:
G — Good; G–F — Good to Fair; F — Fair; F–P — Fair to Poor; P — Poor.

† N.D. — Natural Drainage. ‡ T.D. — Tile Drainage.

## TABLE 19

### ACRE-YIELDS OF SOME CROPS COMMONLY GROWN IN BRUCE COUNTY

| Soil Type | Wheat Bu. | Oats Bu. | Mixed Grain Bu. | Hay Tons |
|---|---|---|---|---|
| Berrien sandy loam | 12 | 20 | 15 | ¾ |
| Bookton sandy loam | 20 | 35 | 30 | 1¼ |
| Brady sandy loam | 12 | 20 | 15 | ¾ |
| Brookston clay loam | 15 | 35 | 35 | 1½ |
| Brookston silt loam | 15 | 35 | 35 | 1½ |
| Burford loam | 30 | 40 | 40 | 1¼ |
| Chesley clay loam | 15 | 35 | 35 | 1½ |
| Chesley silty clay loam | 15 | 35 | 35 | 1½ |
| Chesley silt loam | 15 | 35 | 35 | 1½ |
| Craigleith clay loam | .... | 40 | 35 | 1½ |
| Donnybrook sandy loam | 15 | 25 | 20 | 1 |
| Dumfries loam | 20 | 30 | 25 | 1 |
| Dunedin clay loam | .... | 50 | 45 | 2¼ |
| Elderslie clay loam | 35 | 45 | 40 | 1¾ |
| Elderslie silty clay loam | 35 | 45 | 40 | 1¾ |
| Elderslie silt loam | 35 | 45 | 40 | 1¾ |
| Ferndale clay loam | .... | 35 | 35 | 1½ |
| Ferndale silt loam | .... | 35 | 35 | 1½ |
| Fox sandy loam | 20 | 35 | 30 | 1 |
| Gilford loam | .... | 10 | 8 | ¾ |
| Granby sandy loam | .... | 10 | 8 | ½ |
| Harkaway silt loam | 40 | 60 | 55 | 2¼ |
| Harkaway loam | 40 | 60 | 55 | 2¼ |
| Harkaway silt loam — stony phase | 30 | 40 | 40 | 1½ |
| Harkaway loam — stony phase | 30 | 40 | 40 | 1½ |
| Harriston silt loam | 45 | 60 | 60 | 2½ |
| Harriston loam | 45 | 60 | 60 | 2½ |
| Huron silt loam | 45 | 60 | 60 | 2½ |
| Huron clay loam | 45 | 60 | 60 | 2½ |
| Kemble clay loam | .... | 40 | 40 | 1½ |
| Kemble silt loam | .... | 40 | 40 | 1½ |
| Listowel loam | 35 | 45 | 40 | 2 |
| Listowel silt loam | 35 | 45 | 40 | 2 |
| Morley clay loam | 10 | 25 | 20 | 1 |
| Osprey loam | 20 | 30 | 25 | 1 |
| Parkhill silt loam | 10 | 25 | 20 | ¾ |
| Parkhill loam | 10 | 25 | 20 | ¾ |
| Perth clay loam | 35 | 45 | 40 | 1¾ |
| Perth silt loam | 35 | 45 | 40 | 1¾ |
| Sargent loam | 20 | 35 | 30 | 1¼ |
| Saugeen silt loam | 40 | 55 | 55 | 2¼ |
| Saugeen silty clay loam | 40 | 55 | 55 | 2¼ |
| Saugeen clay loam | 40 | 55 | 55 | 2¼ |
| Sullivan sandy loam | 20 | 30 | 25 | 1 |
| Sullivan sand | 10 | 20 | 15 | ¾ |
| Teeswater silt loam | 50 | 60 | 60 | 2½ |
| Tioga sandy loam | .... | 25 | 20 | ¾ |
| Tioga sand | .... | 15 | 10 | ½ |
| Toledo silt loam | 15 | 35 | 35 | 1½ |
| Toledo clay loam | 15 | 35 | 35 | 1½ |
| Vincent silt loam | 40 | 60 | 55 | 2 |
| Vincent clay loam | 40 | 60 | 55 | 2 |
| Waterloo sandy loam | 15 | 25 | 20 | 1 |
| Wauseon sandy loam | .... | 10 | 8 | ½ |

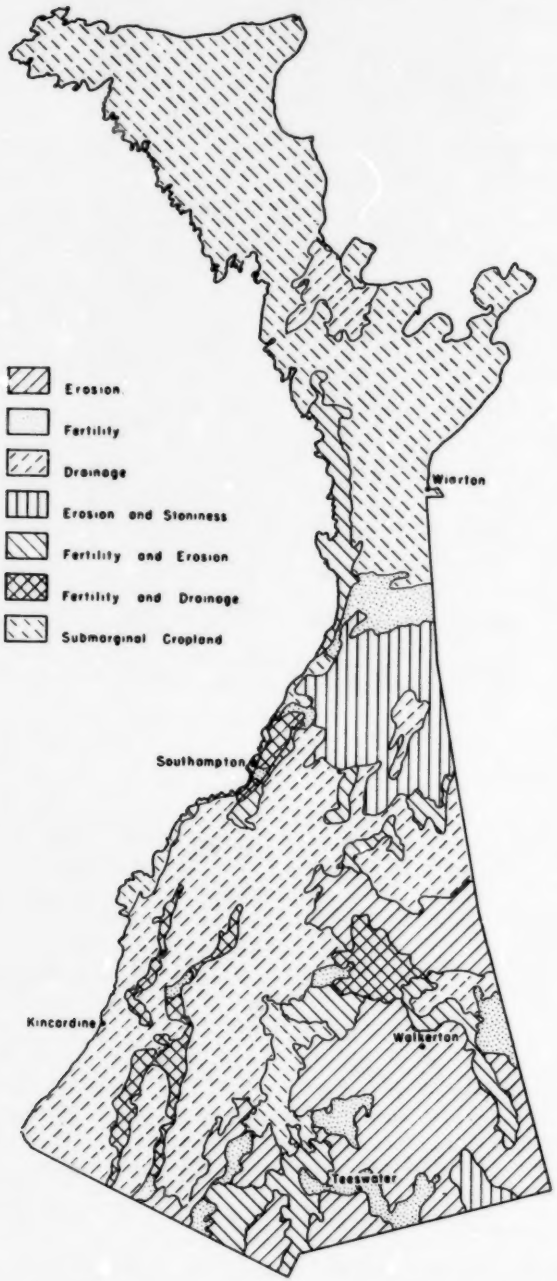
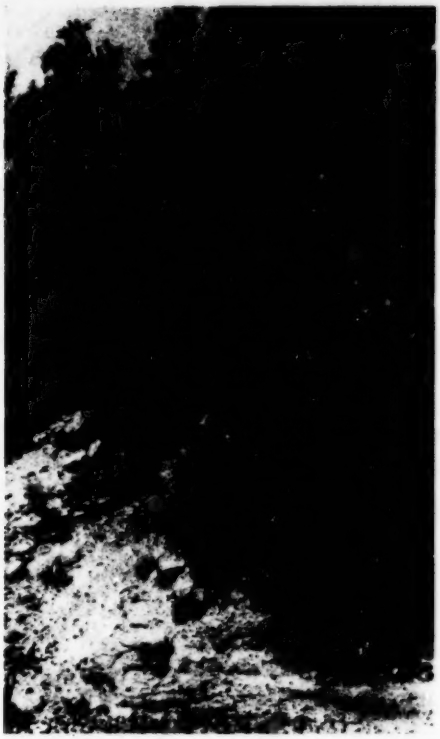



***FIG. 14—Outline map showing the problem areas.***



*Gully-erosion is often a problem along the lakeshore.*

**Problem Areas**

Areas exist in Bruce County where certain problems or hazards affecting the use of the soils are more prominent than in others. The main problems occurring in the County may be attributed to the effect of one or a combination of one or more such factors as susceptibility to erosion, lack of fertility, and inadequate drainage. Areas in the County occur where, provided good soil management practices are employed, the soils can be used without any serious problem developing. The general location and size of each problem area are outlined in Fig. 14.

**Erosion**

Areas in which erosion is the main problem are those where the soils are loam to clay loam in texture and have smooth moderately sloping topography. A certain amount of water runs over the surface rather than through the profile carrying with it varying amounts of valuable topsoil.

**Erosion and Stoniness**

Stony soils with moderate to steep slopes have problems in erosion prevention and stoniness. Loss of soil is most easily controlled through the use of

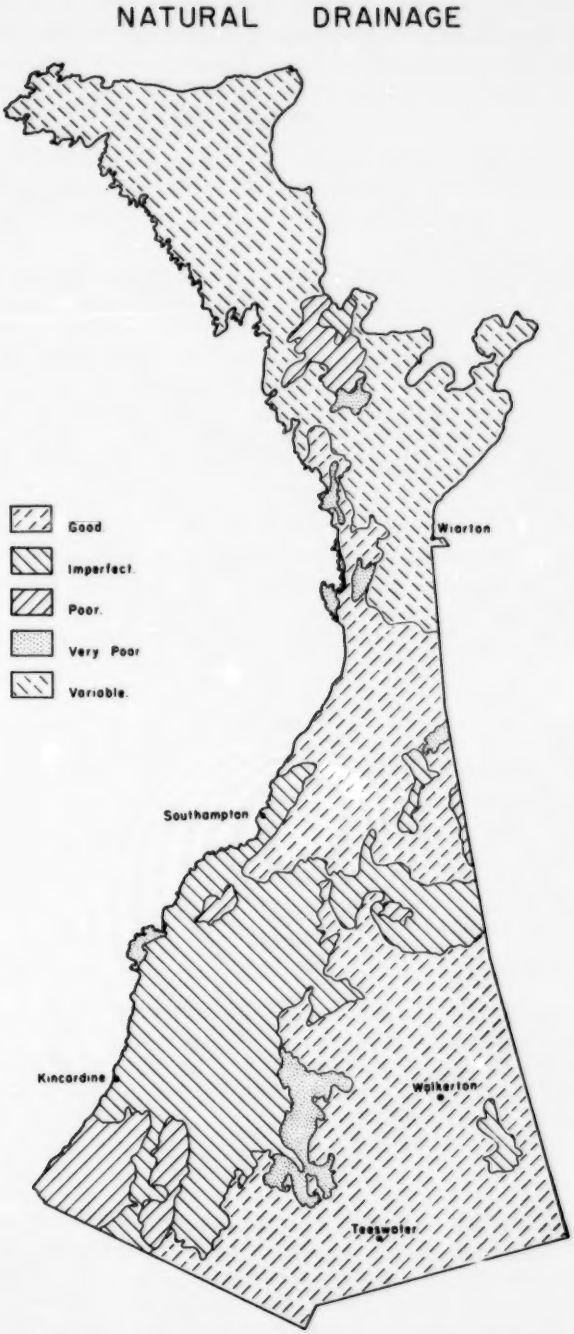



***FIG. 15—Outline map showing the distribution of drainage classes.***

rotations consisting largely of sod crops. Stones interfering with cultivation should be removed.

### Fertility

Fertility maintenance is necessary to keep the soils in a productive state. Although the soils in the areas shown in Fig. 14 are not low in fertility, additions of fertilizers and manure are needed to maintain the plant nutrient levels.

### Fertility and Erosion

Problems in fertility maintenance and erosion prevention occur on soils having steeply sloping topography and a sandy loam surface texture. Keeping the land under sod for as long a proportion of time as possible will control erosion. Sandy textured soils are low in phosphorus, potassium and nitrogen, which can be supplied by commercial fertilizers. Manure is also required to maintain the organic matter level of these soils.

### Drainage

The areas of good, imperfect, poor, very poor and variable drainage are delineated in Fig. 15. Soil drainage depends on the rate of water percolation through the soil and the rate of surface run-off. Water percolation and surface run-off are closely related to texture, topography, and permeability of soil horizons.

**TABLE 20**

**Drainage of Bruce County Soils**

| Drainage Class | Acreage | % of Total |
|---|---|---|
| Good | 353,200 | 32.8 |
| Imperfect | 229,600 | 21.2 |
| Poor | 130,500 | 11.7 |
| Very poor | 68,400 | 6.4 |
| Variable | 274,300 | 25.9 |

### Fertility and Drainage

Problems in fertility maintenance and drainage improvement occur on the imperfectly and poorly drained, low fertility sandy loams. Where drainage is improved, fertility should be maintained by the use of fertilizers high in nitrogen, phosphorus and potassium. Barnyard manure is needed to maintain the organic matter content of the soils.

### Submarginal

An important phase of soil and water conservation involves the establishment of practical methods for the use of submarginal lands. When this land occurs with relative infrequency between productive fields it is planted to grass, legumes, shrubs, vines or trees in such a manner as to control erosion and act as a water reservoir. Where possible, it should provide the owner with a supplementary income.

A much more difficult land utilization problem is presented in those regions where submarginal land occurs in such large blocks that they cannot be operated profitably under individual ownership. Where such areas occur they could be purchased by some public welfare interest.

It is suggested that the large and small areas of submarginal land occurring in Bruce County could best be used for recreational or reforestation purposes.

## TABLE 21

### ACREAGES OF PROBLEM AREAS IN BRUCE COUNTY

| Problems | Acreage | % of Total |
|---|---|---|
| Erosion | 150,800 | 13.9 |
| Erosion and stoniness | 60,000 | 5.5 |
| Fertility | 65,300 | 6.0 |
| Fertility and erosion | 78,100 | 7.7 |
| Drainage | 298,400 | 25.5 |
| Fertility and drainage | 60,900 | 5.5 |
| Submarginal | 344,200 | 32.4 |

# PART V

# ANALYTICAL DATA

Chemical and physical analyses of surface soils and of some soil profiles are presented in Tables 22 and 23 respectively. The chemical analyses of surface soils have some value as indications of the comparative levels of available plant nutrients. The physical analyses indicate the relative amounts of sand, silt and clay in the samples analysed. The chemical and physical analyses of the soil profiles provide data useful in the study of soil formation.

## Sampling

The samples for analysis were taken after the County was surveyed and mapped. The number of samples of surface soil from each soil type taken was determined largely by the extent and importance of the particular type. In order to eliminate as far as possible variations due to cultural and management practices the samples of surface soil were taken from old pastures where fertilizer applications had not been made recently. The profile samples were taken from undisturbed locations in woodlots.

## Analytical Methods

| | |
|---|---|
| Mechanical Analysis | Bouyoucos Hydrometer method. Ref.: Soil Science, Vol. 42, 1936, p. 225. |
| | NOTE: Organic matter not destroyed prior to dispersion. |
| Reaction | Glass electrode. |
| Readily Soluble Phosphorus | Lohse, Ruhnke method. Ref.: Soil Science 35:6, 1933. |
| Base Exchange Capacity and Available Potassium, Calcium, Magnesium | Schollenberger, Simon method. Ref.: Soil Science 51:1, 1945. |
| | NOTE: The alternate was used in which the soil is leached with 1 N KCl. |
| Organic Matter | Allison method. Ref.: Soil Science, October 1935. |

## TABLE 22

### CHEMICAL AND PHYSICAL COMPOSITION OF SURFACE SOIL FROM BRUCE COUNTY, ONTARIO

| Series | Sample No. | Location | | | Sand | Silt | Clay | Reaction pH Glass Electrode | Phosphorus Readily Soluble Lbs. P/Acre | Base Exchange Capacity Me/100gms. | Exchangeable Potassium Me/100gm. | Exchangeable Calcium Me/100gm. | Exchangeable Magnesium Me/100gm. | Organic Matter %C x1.724 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Bouyoucos Hydrometer | | | | | | | | | |
| | | Township | Lot | Conc. | Per Cent 1-.05mm | Per Cent .05-.002mm | Per Cent <.002 | | | | | | | |
| Berrien | 39 | Huron | 27 | XII | 55.0 | 31.2 | 13.8 | 6.9 | 146 | 13.83 | .087 | 13.3 | 3.5 | 4.26 |
| | 40 | Huron | 22 | XII | 53.2 | 28.6 | 18.2 | 6.3 | 260 | 12.62 | .070 | 12.1 | 5.2 | 4.97 |
| | 44 | Huron | 20 | VII | 50.2 | 34.0 | 15.8 | 6.6 | 166 | 15.41 | .151 | 16.3 | 2.6 | 4.39 |
| Brookston | 37 | Huron | 36 | VI | 23.2 | 50.2 | 26.6 | 7.1 | 122 | 23.60 | .310 | 22.2 | 6.6 | 6.98 |
| | 38 | Huron | 31 | IV | 37.4 | 37.8 | 24.8 | 7.5 | 280 | 18.27 | .198 | 44.1 | 8.5 | 6.25 |
| | 41 | Huron | 18 | XII | 37.8 | 37.0 | 25.2 | 6.6 | 240 | 25.63 | .117 | 19.1 | 5.8 | 7.73 |
| | 42 | Huron | 15 | XI | 24.8 | 33.2 | 32.0 | 7.0 | 389 | 27.08 | .260 | 24.4 | 6.7 | 6.67 |
| | 43 | Huron | 16 | X | 30.6 | 41.6 | 27.8 | 6.8 | 204 | 24.60 | .156 | 20.0 | 6.0 | 7.65 |
| Burford | 24 | Kinloss | 51 | VII | 47.0 | 39.4 | 13.8 | 7.0 | 28 | 13.60 | .135 | 20.8 | 3.0 | 3.14 |
| | 52 | Huron | 19 | I | 45.4 | 37.6 | 17.0 | 7.5 | 40 | 16.98 | .084 | 16.6 | 2.6 | 3.36 |
| Chesley | 53 | Elderslie | 17 | IX | 25.0 | 53.2 | 21.8 | 6.4 | 310 | 28.00 | .151 | 21.7 | 4.3 | 6.84 |
| | 54 | Elderslie | 30 | IX | 20.6 | 56.4 | 23.0 | 6.8 | 289 | 35.17 | .211 | 27.6 | 8.0 | 8.13 |
| | 57 | Arran | 30 | II | 23.2 | 58.3 | 18.5 | 7.0 | 450 | 40.23 | .161 | 32.4 | 8.9 | 11.26 |
| | 58 | Arran | 12 | IV | 21.4 | 55.0 | 22.6 | 7.2 | 270 | 23.86 | .264 | 19.5 | 5.7 | 7.32 |
| | 60 | Bruce | 1 | XI | 24.1 | 52.4 | 23.5 | 7.0 | 348 | 30.50 | .175 | 26.6 | 7.4 | 7.86 |
| Donnybrook | 23 | Culross | 31 | VIII | 47.2 | 42.0 | 10.8 | 7.6 | 94 | 11.28 | .204 | 14.6 | 4.0 | 3.16 |
| | 25 | Kinloss | 30 | I | 50.6 | 38.8 | 10.6 | 7.3 | 138 | 14.16 | .107 | 16.8 | 6.8 | 3.04 |
| | 32 | Culross | 5 | IV | 55.8 | 30.6 | 13.6 | 7.2 | 60 | 18.50 | .066 | 15.5 | 5.7 | 4.23 |
| | 33 | Culross | 22 | X | 54.6 | 39.6 | 5.8 | 7.0 | 140 | 12.10 | .074 | 21.2 | 4.3 | 3.81 |
| Dumfries | 16 | Carrick | 10 | VI | 37.6 | 48.2 | 14.2 | 7.1 | 94 | 11.76 | .178 | 14.4 | 3.1 | 3.63 |
| | 17 | Carrick | 10 | III | 34.8 | 50.4 | 14.8 | 6.9 | 105 | 14.82 | .097 | 15.8 | 4.1 | 3.24 |
| | 18 | Carrick | 11 | IV | 37.4 | 47.0 | 13.6 | 7.4 | 63 | 16.08 | .114 | 20.3 | 3.8 | 4.04 |
| | 19 | Carrick | 15 | IV | 53.0 | 35.4 | 11.6 | 7.0 | 68 | 12.90 | .070 | 13.5 | 2.8 | 3.05 |
| Elderslie | 55 | Elderslie | 25 | VII | 25.0 | 53.4 | 21.6 | 7.1 | 213 | 16.52 | .130 | 18.3 | 3.3 | 5.22 |
| | 56 | Elderslie | 10 | V | 21.3 | 52.7 | 26.0 | 6.8 | 141 | 24.16 | .258 | 27.7 | 4.2 | 6.60 |

## TABLE 22 (*Cont'd*)
## CHEMICAL AND PHYSICAL COMPOSITION OF SURFACE SOIL FROM BRUCE COUNTY, ONTARIO

| Series | Sample No. | Location | | | Sand | Silt | Clay | Reaction pH Glass Electrode | Phosphorus Readily Soluble Lbs. P/Acre | Base Exchange Capacity Me/100gms. | Exchangeable Potassium Me/100gm. | Exchangeable Calcium Me/100gm. | Exchangeable Magnesium Me/100gm. | Organic Matter %C x1.724 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Bouyoucos Hydrometer | | | | | | | | | |
| | | Township | Lot | Conc. | Per Cent 1-.05mm | Per Cent .05-.002mm | Per Cent <.002 | | | | | | | |
| | 59 | Bruce | 16 | XIV | 18.6 | 57.1 | 24.3 | 7.2 | 372 | 22.11 | .115 | 24.8 | 6.1 | 6.57 |
| | 61 | Bruce | 15 | VII | 17.9 | 58.5 | 23.6 | 6.6 | 234 | 18.96 | .141 | 15.9 | 3.2 | 4.88 |
| | 62 | Saugeen | 19 | IV | 23.2 | 54.2 | 22.6 | 6.9 | 130 | 29.80 | .154 | 26.6 | 6.4 | 8.54 |
| | 66 | Saugeen | 29 | III | 19.3 | 56.5 | 24.2 | 7.4 | 156 | 21.55 | .205 | 20.3 | 4.6 | 5.62 |
| Ferndale | 1 | Lindsay | 6 | IIE | 23.6 | 50.6 | 25.8 | 7.4 | 278 | 25.08 | .194 | 31.6 | 6.3 | 7.58 |
| | 8 | Eastnor | 10 | IIIE | 35.6 | 38.7 | 25.7 | 7.0 | 397 | 20.93 | .255 | 22.6 | 7.9 | 6.83 |
| | 10 | Eastnor | 15 | VE | 37.2 | 40.1 | 22.7 | 7.2 | 489 | 17.65 | .200 | 22.1 | 4.8 | 5.44 |
| | 11 | Eastnor | 10 | VE | 30.6 | 47.2 | 22.2 | 7.4 | 219 | 27.30 | .266 | 29.0 | 4.0 | 7.11 |
| Harkaway | 4 | Lindsay | 20 | IVW | 43.2 | 43.4 | 13.4 | 7.1 | 66 | 13.62 | .156 | 15.5 | 4.7 | 4.52 |
| | 63 | Arran | 27 | VII | 32.0 | 53.0 | 15.0 | 7.6 | 80 | 11.47 | .215 | 26.6 | 6.0 | 3.16 |
| | 64 | Arran | 16 | IX | 29.2 | 52.2 | 18.6 | 7.4 | 115 | 16.56 | .125 | 18.3 | 8.1 | 5.62 |
| | 65 | Amabel | 15 | II | 31.4 | 50.8 | 17.8 | 7.0 | 95 | 14.30 | .175 | 14.0 | 7.7 | 5.93 |
| | 67 | Amabel | 1 | C | 33.6 | 54.1 | 12.3 | 7.2 | 40 | 15.18 | .077 | 20.4 | 6.4 | 6.74 |
| Harriston | [illegible] | Carrick | 1 | VIII | 32.6 | 49.6 | 17.8 | 7.0 | 74 | 13.20 | .176 | 18.2 | 5.3 | 3.96 |
| | 1[illegible] | Culross | 1 | VIII | 34.4 | 50.6 | 15.0 | 7.4 | 138 | 14.50 | .082 | 25.4 | 3.8 | 4.49 |
| | 21 | Carrick | 31 | VII | 32.2 | 49.4 | 18.4 | 7.6 | 66 | 15.27 | .077 | 21.0 | 6.8 | 5.07 |
| | 26 | Culross | 28 | V | 36.6 | 47.2 | 16.2 | 7.2 | 41 | 11.19 | .225 | 15.4 | 5.4 | 3.76 |
| | 28 | Culross | 21 | III | 35.2 | 46.0 | 18.8 | 6.7 | 124 | 15.98 | .188 | 11.5 | 4.3 | 4.32 |
| | 50 | Greenock | 75 | III | 36.8 | 44.2 | 19.0 | 6.8 | 58 | 16.30 | .059 | 17.1 | 4.8 | 4.69 |
| Listowel | 15 | Culross | 1 | VI | 33.6 | 50.6 | 15.8 | 6.7 | 86 | 23.06 | .133 | 19.9 | 4.2 | 7.60 |
| | 29 | Culross | 16 | IV | 47.0 | 41.2 | 11.8 | 7.5 | 140 | 13.00 | .068 | 27.8 | 6.3 | 4.60 |
| | 33 | Culross | 12 | XIII | 44.6 | 39.6 | 15.8 | 6.9 | 235 | 15.49 | .138 | 24.4 | 5.3 | 5.02 |
| | 34 | Carrick | 5 | A | 33.4 | 52.4 | 14.2 | 7.3 | 99 | 14.62 | .089 | 15.5 | 3.2 | 4.73 |
| | 46 | Carrick | 20 | XI | 36.6 | 46.6 | 16.8 | 6.8 | 154 | 12.87 | .038 | 13.2 | 4.8 | 4.52 |
| | 51 | Brant | 1 | IV | 40.7 | 47.0 | 12.3 | 7.0 | 168 | 18.82 | .070 | 23.3 | 5.2 | 6.25 |
| Parkhill | 20 | Carrick | 31 | II | 32.0 | 52.6 | 15.4 | 7.1 | 285 | 25.16 | .041 | 32.8 | 8.8 | 7.64 |
| | 68 | Brant | 7 | IS | 42.8 | 40.4 | 16.8 | 7.4 | 360 | 20.24 | .059 | 19.0 | 7.2 | 8.17 |
| | 69 | Greenock | 8 | V | 48.2 | 33.2 | 18.6 | 6.7 | 442 | 36.58 | .092 | 30.3 | 8.2 | 9.47 |
| | 70 | Greenock | 41 | IS | 39.0 | 44.7 | 16.3 | 6.5 | 190 | 27.85 | .122 | 22.2 | 5.3 | 7.51 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Perth | 36 | Huron | 36 | IX | 21.0 | 44.4 | 34.6 | 6.6 | 119 | 18.64 | .285 | 17.7 | 6.6 | 5.22 |
| | 71 | Kinloss | 59 | IIS | 38.8 | 39.0 | 22.2 | 6.8 | 380 | 13.21 | .247 | 20.4 | 5.5 | 4.39 |
| | 72 | Kinloss | 57 | IIIN | 34.2 | 38.6 | 27.2 | 7.0 | 160 | 23.90 | .187 | 30.8 | 8.0 | 6.74 |
| | 73 | Kincardine | 10 | IIS | 30.0 | 49.8 | 22.4 | 7.3 | 210 | 19.05 | .109 | 20.6 | 4.5 | 5.90 |
| | 74 | Kincardine | 16 | IV | 28.6 | 52.6 | 18.8 | 6.8 | 425 | 25.61 | .134 | 27.0 | 4.9 | 6.57 |
| | 75 | Kincardine | 11 | XII | 28.4 | 53.2 | 18.4 | 7.0 | 90 | 26.11 | .162 | 23.4 | 7.2 | 7.04 |
| Sargent | 6 | Eastnor | 15 | IW | 54.4 | 35.2 | 10.4 | 7.4 | 120 | 11.26 | .059 | 25.4 | 4.1 | 5.24 |
| | 5 | Eastnor | 15 | IVE | 66.0 | 20.2 | 13.8 | 6.9 | 95 | 8.52 | .088 | 18.3 | 4.4 | 4.32 |
| | 9 | Eastnor | 22 | IVE | 49.8 | 36.8 | 13.4 | 7.2 | 150 | 14.73 | .048 | 17.1 | 5.2 | 5.61 |
| Saugeen | 76 | Bruce | 17 | E | 30.2 | 52.2 | 17.6 | 7.2 | 130 | 25.74 | .146 | 22.2 | 8.7 | 5.92 |
| | 77 | Saugeen | 29 | VI | 28.0 | 51.0 | 21.0 | 6.5 | 125 | 20.16 | .137 | 17.0 | 4.5 | 4.73 |
| | 78 | Greenock | 53 | XXII | 20.0 | 54.2 | 25.8 | 7.4 | 180 | 26.09 | .126 | 26.6 | 5.1 | 6.27 |
| | 79 | Brant | 33 | XIII | 27.2 | 51.6 | 21.2 | 6.6 | 73 | 21.03 | .146 | 16.2 | 4.9 | 5.30 |
| | 80 | Brant | 17 | XII | 25.6 | 53.2 | 21.2 | 7.0 | 155 | 17.80 | .138 | 18.5 | 6.0 | 4.82 |
| Waterloo | 45 | Carrick | 30 | IX | 73.0 | 22.0 | 5.0 | 7.2 | 70 | 10.56 | .110 | 11.4 | 3.5 | 3.27 |
| | 47 | Carrick | 26 | XV | 53.2 | 39.0 | 7.8 | 7.6 | 55 | 11.26 | .087 | 21.6 | 3.7 | 3.50 |
| | 48 | Brant | 12 | IX | 57.8 | 32.0 | 10.2 | 6.8 | 132 | 6.78 | .041 | 9.7 | 4.5 | 2.90 |
| | 49 | Brant | 10 | IV | 54.0 | 30.0 | 12.0 | 6.7 | 50 | 12.67 | .050 | 8.9 | 4.1 | 4.92 |
| Wauseon | 7 | Eastnor | 11 | IE | 68.4 | 21.4 | 10.2 | 6.6 | 215 | 13.82 | .029 | 8.6 | 3.5 | 6.30 |
| | 3 | Eastnor | 26 | IW | 70.6 | 25.2 | 4.2 | 7.2 | 168 | 15.90 | .038 | 10.9 | 6.4 | 8.74 |

## TABLE 23

### CHEMICAL AND PHYSICAL ANALYSES OF SOME SOIL PROFILES FROM BRUCE COUNTY, ONTARIO

| Sample No. and Soil Type | Mechanical Analysis | | | | pH | Total Exchange Capacity Me/100gms | Exchangeable Potassium Me/100gms | Exchangeable Calcium Me/100gms | Exchangeable Magnesium Me/100gms | % Organic Matter | Phosphorus p.p.m. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | % Sand | % Silt | % Clay | Total Colloids | | | | | | | |
| Harriston — $A_1$ | 40.6 | 48.2 | 11.2 | 15.7 | 6.9 | 27.20 | .3013 | 22.8 | 13.94 | 2.9 | 14.5 |
| $A_{21}$ | 46.4 | 45.2 | 8.4 | 13.2 | 5.2 | 6.84 | .0959 | 2.1 | 2.58 | 1.5 | 4.0 |
| $A_{22}$ | 41.0 | 46.6 | 12.6 | 16.8 | 6.0 | 5.64 | .0856 | 3.2 | 2.20 | 0.6 | 13.4 |
| B | 39.4 | 35.0 | 25.6 | 39.2 | 6.8 | 15.12 | .2332 | 14.8 | 16.12 | 1.1 | 105.5 |
| C | 34.0 | 47.2 | 18.8 | 31.8 | 7.9 | 5.08 | .1398 | 26.9 | 8.38 | 0.3 | 111.0 |
| Listowel — $A_1$ | 39.4 | 44.0 | 16.6 | 33.4 | 6.8 | 21.40 | .2509 | 27.8 | 6.38 | 4.6 | 8.4 |
| $A_2$ | 37.2 | 41.8 | 21.0 | 36.0 | 7.1 | 14.16 | .1452 | 14.4 | 3.74 | 2.0 | 13.0 |
| B | 43.4 | 31.6 | 25.0 | 35.4 | 7.2 | 17.68 | .1501 | 28.0 | 4.98 | 1.6 | 89.0 |
| C | 39.2 | 43.4 | 17.4 | 27.2 | 7.8 | 4.68 | .2854 | 10.7 | 7.58 | 0.7 | 86.0 |
| Huron — $A_1$ | 47.2 | 32.2 | 20.6 | 34.0 | 6.9 | 28.60 | 1.049 | 20.6 | 4.06 | 4.3 | 80.0 |
| $A_{21}$ | 43.6 | 34.6 | 21.8 | 36.0 | 6.9 | 14.96 | .4756 | 13.4 | 1.56 | 2.9 | 8.8 |
| $A_{22}$ | 40.6 | 35.8 | 23.6 | 38.6 | 6.8 | 8.88 | .1968 | 6.6 | 13.40 | 1.0 | 12.8 |
| B | 32.0 | 46.8 | 31.2 | 52.4 | 7.3 | 14.20 | .5012 | 19.0 | 17.1 | 0.5 | 216.0 |
| C | 26.6 | 28.8 | 54.6 | 49.8 | 7.8 | 9.36 | .2751 | 33.4 | 11.04 | 0.2 | 180.0 |
| Burford — $A_1$ | 59.4 | 31.2 | 9.4 | 14.0 | 6.9 | 27.92 | .4551 | 19.2 | 16.76 | 3.9 | 6.0 |
| $A_2$ | 58.3 | 28.3 | 13.4 | 17.0 | 5.5 | 7.96 | .0581 | 3.1 | 3.76 | 1.4 | 3.0 |
| B | 57.4 | 25.8 | 16.8 | 27.2 | 6.9 | 13.80 | .1675 | 2.9 | .34 | 1.6 | 24.0 |
| C | 80.4 | 12.0 | 7.6 | 9.8 | 8.0 | 2.08 | .0475 | 11.4 | 2.38 | 0.06 | 25.0 |
| Teeswater — $A_1$ | 24.8 | 63.6 | 11.6 | 28.0 | 6.4 | 23.40 | .2461 | 16.0 | 6.5 | 3.9 | 7.0 |
| $A_{21}$ | 21.4 | 63.2 | 15.4 | 32.0 | 5.4 | 9.36 | .0789 | 1.3 | 3.5 | 2.1 | 12.0 |
| $A_{22}$ | 31.2 | 59.2 | 9.6 | 24.4 | 5.5 | 5.56 | .0861 | 1.7 | 3.7 | 1.3 | 14.0 |
| B | 44.8 | 24.0 | 31.2 | 30.8 | 6.5 | 12.96 | .2760 | 16.2 | 18.4 | 0.7 | 34.0 |
| C | 67.0 | 28.8 | 4.2 | 12.8 | 7.7 | 2.88 | .1162 | 18.2 | 8.3 | 0.4 | 38.0 |
| Perth — $A_1$ | 33.2 | 49.6 | 17.2 | 36.8 | 6.9 | 37.08 | 1.3650 | 37.5 | 7.16 | 5.4 | 10.0 |
| $A_2$ | 27.8 | 50.2 | 22.0 | 40.2 | 7.1 | 1.30 | .1862 | 12.2 | 2.30 | 2.3 | 9.0 |
| B | 21.6 | 37.2 | 41.2 | 54.6 | 7.3 | 20.60 | .3780 | 21.5 | 9.48 | 1.5 | 75.0 |
| C | 28.0 | 44.0 | 28.0 | 44.0 | 7.8 | 7.10 | .1738 | 24.1 | 6.88 | 0.7 | 18.0 |

RP-2-90-1M
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ISBN 0-7729-6694-X